USAAVLABS TECHNICAL REPORT 66-68

CH-47A CHINOOK FLIGHT LOADS INVESTIGATION PROGRAM

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND
TECHNICAL INFORMATION
Hardoopy Microfiche
\$5.00 \$1.00 | 86,600

ARCHIVE COPY

By

Joseph F. Braun

F. Joseph Giessler

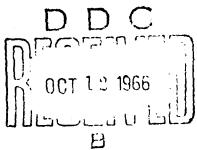
July 1966

U. S. ARMY AVIATION MATERIEL LABORATORIES FORT EUSTIS, VIRGINIA

CONTRACT DA 44-177-AMC-221(T)
TECHNOLOGY INCORPORATED
DAYTON, OHIO

Distribution of this document is unlimited





Disclaimers

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that Government may have formulated, furnished, or in any way supplied and said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission, to manufacture, use, or sell any patented invention that may in any way be related thereto.

Trade names cited in this report do not constitute an official endorsement or approval of the use of such commercial hardware or software.

Disposition Instructions

Destroy this report when no longer needed. Do not return it to the originator.

100	N G
CISH	WHITE SECTION !
TAX X THOU	DOFF SESTION []
STIFICA	I II

DKY919H	134 VEVARIABILITY COOES
aust.	AVAIL MO/OF SPENIAL
	ATTALL SHEET AT STEEL AT
ı	,



DEPARTMENT OF THE ARMY U. S. ARMY AVIATION MATERIEL LABORATORIES FORT EUSTIS. VIRGINIA 23604

This report has been reviewed by this Command and is considered to be technically sound. The report is published for the exchange of information and the stimulation of ideas.

Task 1P125901A14229 Contract DA 44-177-AMC-221(T) USAAVLABS Technical Report 66-68 July 1966

a Marie

CH-47A CHINOOK FLIGHT LOADS INVESTIGATION PROGRAM

by
Joseph F. Braun
F. Joseph Giessler

Prepared by

Technology Incorporated Dayton, Ohio

for

U. S. ARMY AVIATION MATERIEL LABORATORIES FORT EUSTIS, VIRGINIA

Distribution of this document is unlimited

ABSTRACT

This report covers the collection and presentation of 165 hours of usable flight data for the CH-47A helicopter. The data recording system and the data processing procedure are described, and an analysis summary of the results of the flight data is presented. The flight data were recorded between 9 September 1964 and 2 December 1965. The area of operation was primarily at or adjacent to Fort Benning, Georgia. To analyze parameters according to distinct flight phases, the reduced data were separated into four mission segments: (1) takeoff and ascent; (2) maneuver; (3) descent, flare, and landing; and (4) steady state. In the form of tables, histograms, and exceedance curves, the data indicate the time flown in the mission segments and parameter ranges and the number of parameter peaks occurring in the missions and ranges of other parameters. Exceedance curves are given for both the maneuver and the gust normal load factors.

FOREWORD

The CH-47A helicopter phase of the research effort entitled "Flight Loads Investigation Program" is covered in this report. This phase of the program was intended to collect, process, and analyze 200 hours of operational flight loads data.

The program, which extended from 30 June 1964 to 15 February 1966, was sponsored by the U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, under Contract DA 44-177-AMC-221(T). Mr. David Chestnutt was the contract monitor.

Principal investigators for Technology Incorporated were as follows: Mr. Joseph F. Braun, project engineer, was in charge of vehicle instrumentation and data acquisition; Messrs. Cyril Peckham and John Nash, respectively, established and implemented the data processing procedure; Mr. William Morrin wrote the computer program to govern the computer calculation and compilation of data; Mr. Larry Clay directed the data analysis and presentation; and Dr. Robert Loewy, consultant, lent analytical support in the analysis and presentation of the helicopter data.

CONTENTS

														Page
ABS	TRA	CT.	•	•	•	•	•	•	•	•	•	•	•	iii
FOR	EWO	ORD.	•	•	•	•	•	•	•	•	•	•	•	v
LIST	r of	ILLUS	TRA	TIO	NS	•	•	•	•	•		•	•	viii
LIST	r of	TABL	ES	•	•	•	•	•	•	•	•	•	•	xii
LIST	r of	SYMB	OLS	•	•	•	•	•	•	•	•	•	•	xv
INT	ROD	UCTIO	N.	•	•	•	•	•	•	•	•	•	•	1
PRC	GRA	м овј	ECT	IVE	S	•	•	•	•	•	•	•	•	2
TAG	A R	ECORD	ING	ANI	D PRO	CE	SSINC	ì.	•	•	•	•	•	3
		Recor	_		•	•	•	•	•	•	•	•	•	3
		Editin	_				•	•	•	•	•	•	•	3
	Data	Readi:	ng an	id Q	uality	Co	ntrol	•	•	•	•		•	5
	Data	Comp	utatio	ons	•	•	•	•	•	•	•	•	•	6
DAT	'A R	ESULT	s.	•	•	•	•	•	•	•	•	•	•	8
CON	CLU	ISIONS	•	•	•	•	•	•	•	•	•	•	•	11
REF	ERE	NCES	•	•	•	•	•	•	•	•	•	•	•	12
DIST	rrib	UTION	•	•	•	•	•	•	•	•	•	•	•	13
APF	ENI	IXES												
	I.	Illustr	ation	s.	•	•	•	•	•	•	•	•	•	15
	II.	Compu	ter I	Prin	touts	•	•	•	•	•	•	•	•	67

ILLUSTRATIONS

Figure		Pag
1	Block Diagram of CH-47A Instrumentation System	3
2	Percentage of Total Flight Time in Each Mission Segment	15
3	Flight fime in Each Gross Weight Range Broken Down by Percentage of Time in Each Mission Segment	16
	begine it	
	a) Gross Weight Less Than 20,000 Pounds	16
	b) Gross Weight 20,000 to 22,000 Pounds	17
	c) Gross Weight 22,000 to 24,000 Pounds	18
	d) Gross Weight 24,000 to 26,000 Pounds	19
	e) Gross Weight 26,000 to 28,000 Pounds	20 21
	f) Gross Weight 28,000 to 30,000 Pounds	22
	g) Gross Weight 30,000 to 32,000 Pounds h) Gross Weight 32,000 to 34,000 Pounds	23
4	Percentage of Steady-State Mission Segment Flight Time in Each Gross Weight Range	24
5	Percentage of Steady-State Mission Segment Flight Time in Each Density Altitude Range	25
6	Percentage of Steady-State Mission Segment Flight Time in Each Rotor RPM Range	26
7	Percentage of Steady-State Mission Segment Flight Time in Each Outside Air Temperature Range	27
8	Percentage of Steady-State Mission Segment Flight Time in Each Rate of Climb Range	28
9	Percentage of Steady-State Mission Segment Flight Time in Each Airspeed Range	29
10	Time in Steady-State Mission Segment in Less Than 20,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density	30

Figure		Page
11	Time in Steady-State Mission Segment in 20,000- to 22,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	31
12	Time in Steady-State Mission Segment in 22,000- to 24,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	32
13	Time in Steady-State Mission Segment in 24,000- to 26,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	33
14	Time in Steady-State Mission Segment in 26,000- to 28,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	34
15	Time in Steady-State Mission Segment in 28,000- to 30,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	35
16	Time in Steady-State Mission Segment in 30,000- to 32,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	36
17	Time in Steady-State Mission Segment in 32,000- to 34,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range	37
18	Exceedance Curves for Incremental Maneuver Normal Load Factor Peaks by Mission Segment	38
	a) Ascent Mission Segment	38
	b) Maneuver Mission Segment	39
	c) Descent Mission Segment	40
	d) Steady-State Mission Segment	41

Figure		Page
19	Exceedance Curves for Incremental Maneuver	
	Normal Load Factor Peaks by Gross Weight Ranges	42
	a) Less Than 20,000 Pounds	42
	b) 20,000 to 22,000 Pounds	43
	c) 22,000 to 24,000 Pounds	44
	d) 24,000 to 26,000 Pounds	45
	e) 26,000 to 28,000 Pounds	46
	f) 28,000 to 30,000 Pounds	47
	g) 30,000 to 32,000 Pounds	48
	h) 32,000 to 34,000 Pounds	49
20	Exceedance Curves for the Composite of Incre-	
	mental Maneuver Normal Load Factor Peaks	50
21	Diagram and Tabulation of Maneuver Normal	
	Load Factor Peaks in Ranges of Rotor Tip	
	Speed Ratio	51
22	Exceedance Curves for Incrementa! Gust Normal	
	Load Factor Peaks by Mission Segment	52
	a) Ascent Mission Segment	52
	b) Maneuver Mission Segment	53
	c) Descent Mission Segment	54
	d) Steady-State Mission Segment	55
23	Exceedance Curves for Incremental Gust Normal	
	Load Factor Peaks by Gross Weight Ranges	56
	a) Less Than 20,000 Pounds	56
	b) 20,000 to 22,000 Pounds	57
	c) 22,000 to 24,000 Pounds	58
	d) 24,000 to 26,000 Pounds	59
	e) 26,000 to 28,000 Pounds	60
	f) 28,000 to 30,000 Pounds	61
	g) 30,000 to 32,000 Pounds	62
	h) 32,000 to 34,000 Pounds	63
24	Exceedance Curves for Composite of Incremental	
	Gust Normal Load Factor Peaks	64

Figure		Page
25	Diagram and Tabulation of Gust Normal Load	
	Factor Peaks in Ranges of Indicated Airspeeds	65
26	Composite Exceedance Curves for Incremental	
	Gust Normal Load Factor Peaks - CH-54A	
	Helicopter (Referencé 3)	66

TABLES

Table		Page
I	Stick Position Selected Values	5
II	Flight Time for Mission Segment Versus Weight	6
ш	Flight Time for Mission Segment Versus Weight	70
IV	Steady-State Time for Altitude Versus Airspeed by Weight and Total	79
v	Steady-State Time for Collective Stick Position Versus Cyclic Stick Position by Rate of Climb and Total	72
VI	Steady-State Time for Rotor RPM Versus Rate of Climb by Outside Air Temperature and Total	73
vII	Steady-State Time for C_{T}/σ Versus μ by Rate of Climb and Total	75
ипл	Cyclic Stick Peaks Versus Cyclic Stick Steady by Collective Stick Steady	76
IX	Cyclic Stick Peaks Versus Cyclic Stick Steady by Density Altitude	78
x	Cyclic Stick Peaks Versus Cyclic Stick Steady by Airspeed	79
XI	Cyclic Stick Peaks Versus Cyclic Stick Steady by Rotor RPM and Total	83
ХII	Cyclic Stick Peaks Versus Airspeed Acceleration by Mission Segment	84
хш	Cyclic Stick Peaks Versus Airspeed by Mission Segment	85
XIV	Cyclic Stick Peaks Versus Rotor RPM by Mission Segment	86

Table		Pag
xv	Collective Stick Peaks Versus Collective Stick Steady by Cyclic Stick Steady	87
XVI	Collective Stick Peaks Versus Collective Stick Steady by Density Altitude	88
хvII	Collective Stick Peaks Versus Collective Stick Steady by Airspeed	89
XVIII	Collective Stick Peaks Versus Collective Stick Steady by Rotor RPM and Total	93
XIX	Collective Stick Peaks Versus Airspeed Accelera- tion by Mission Segment	94
xx	Collective Stick Peaks Versus Airspeed by Mission Segment	95
XXI °	Collective Stick Peaks Versus Rotor RPM by Mission Segment	96
XXII	Gust n _z Versus Airspeed by Mission Segment by Altitude by Gross Weight	97
xxIII	Gust $n_{\mathbf{Z}}$ Versus μ by Mission Segment by Altitude by $C_{\mathbf{T}}/\sigma$	110
XXIV	Gust n _z Versus µ by Mission Segment	122
xxv	Gust n _z Versus Airspeed by Mission Segment	124
xxvi	Gust n _z Versus μ	126
XXVII	Gust n _z Versus Airspeed	126
кхvш	Maneuver n _z Versus Airspeed by Mission Segment by Altitude by Gross Weight	127
XXIX	Maneuver n_z Versus μ by Mission Segment by Altitude by C_T/σ	147
vvv	Manager v. Vareus u by Mission Sagmont	165

Table		Page
XXXI	Maneuver n _z Versus Airspeed by Mission Segment	167
XXXII	Maneuver n _z Versus µ	169
шххх	Maneuver n _z Versus Airspeed	169

SYMBOLS

Symbol	Definition	Computer Equivalent
$c_\mathtt{T}$	thrust coefficient	CT
C _T /σ	thrust coefficient ratio	CT/S
$^{\mathbf{h}}\mathbf{d}$	density altitude, feet	
nz	normal load factor	NZ
OAT	outside air temperature, ^O F	
$\mathtt{p}_{\mathbf{a}}$	atmospheric static pressure, inches of mercury	
R	rotor radius, 29.55 feet	
v	airspeed, feet per second or knots	
w	gross weight, pounds	
μ	rotor tip speed ratio	MU
π	ratio of circumference to diameter of circle	
ρ	local air density, pounds per square foot	
σ	rotor solidity, 0.062 (Reference 4)	S
Ω	rotor angular velocity, radians per second	

INTRODUCTION

Under contract to the U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, Technology Incorporated assisted in conducting a flight loads program that involved four types of Army rotary- and fixed-wing aircraft: the fixed-wing OV-1A airplane and the rotary-wing UH-1B, CH-54A, and CH-47A helicopters. The program, entitled "Flight Loads Investigation Program", was designed to determine the technical feasibility of recording adequate flight loads on helicopters for the subsequent derivations of loads spectra. From their base at Fort Benning, Georgia, these aircraft flew combat air assault missions during special maneuvers and normal flight training while the flight loads data were recorded. The contribution of the aircraft types to the 697 hours of usable data collected was as follows: OV-1A, 203 hours; UH-1B, 219 hours; CH-54A, 110 hours; and CH-47A, 165 hours.

Since the data from the OV-1A, UH-1B, and CH-54A were presented in previous reports (see References 1, 2, and 3), this report gives the data from only the CH-47A.

The data are presented in the forms of tables, histograms, and exceedance curves. The tables give the number of measured and calculated parameter peaks distributed among various combinations of parameter ranges; the histograms show the percentages of flight time spent in selected ranges of the flight parameters; and the exceedance curves indicate the number of hours required to reach or exceed both maneuver and gust normal load factors.

PROGRAM OBJECTIVES

The primary program objective was to determine the magnitude and relative frequency of the loads incurred by each of the four aircraft types. Parameters chosen for measurement were those considered to be most indicative of the loads sustained and most descriptive of the aircraft motion and activity.

A sample of 200 hours of usable flight data from each aircraft type was desired in order to perform the data analysis. Although two of the four aircraft types did not accumulate these hours because of problems and complications inherent in a field test program, the actual data acquired were sufficient for a valid sample. Furthermore, since the data results provide the initially desired design information and will likely lead to improved operational procedures, it is believed that the program objectives were fulfilled.

DATA RECORDING AND PROCESSING

1

DATA RECORDING

As illustrated by the functional block diagram in Figure 1, an oscillographic recording system was installed in each of six CH-47 helicopters. Eight parameters were recorded on the oscillograms: (1) airspeed, (2) altitude, (3) normal acceleration at the center of gravity, (4) outside air temperature, (5) rotor rpm, (6) collective stick position, (7) longitudinal cyclic stick position, and (8) time. Between 9 September 1964 and 2 December 1965, 165 hours of usable flight data were collected during 769 flights which involved 230 engine starts.

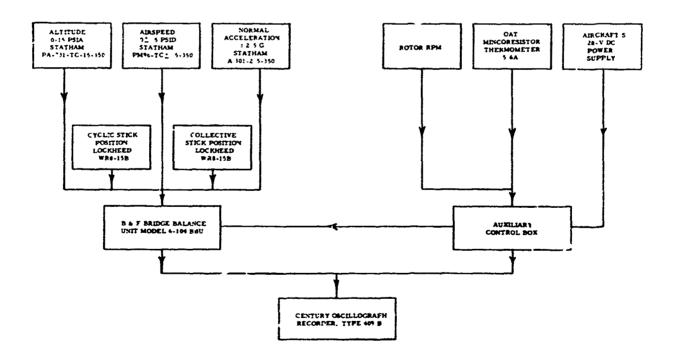


Figure 1. Block Diagram of CH-47A Instrumentation System

DATA EDITING PROCEDURES

Data editing consisted principally of checking time intervals, marking off each flight into four mission segments, determining the acceleration

peaks to be read and identifying the cause as either gust or maneuver, and determining the longitudinal cyclic and collective stick positions to be read.

The four mission segments are (1) takeoff and ascent; (2) maneuvering; (3) descent, flare, and landing; and (4) steady state. During the first three mission segments, which comprise the transient part of flight, the stick position traces show no steady values about which the stick traces seem to deviate, while the airspeed and altitude traces manifest frequent changes. Mission Segment 1 (takeoff and ascent) includes not only the takeoff and climb to the initial steady-flight altitude but also unsteady ascents to other steady-flight altitudes. Mission Segment 2 (maneuvering) consists of any transient parts of flight which are not characteristic of Mission Segments 1 and 3. During maneuvering, the normal acceleration trace is usually very active. In addition to the unsteady part of flare and landing, Mission Segment 3 (descent, flare, and landing) includes the unsteady part of any descent whether intended for a new steady-flight altitude or for landing. Mission Segment 4 (steady state) includes those parts of the flight where the stick traces are relatively steady and where the airspeed and altitude traces are steady or changing smoothly. Such characteristics prevailed during cruise, hover, and steady ascent and descent.

The criterion for selecting acceleration peaks to be read was those peaks which were outside fixed threshold levels and which rose or fell 50 percent of the peak value, or 0.2g, whichever was greater. Whereas the fixed thresholds were 0.8 and 1.2g, editors used levels of 0.84 and 1.16g to ensure the inclusion of all valid peaks. Any peaks found within the fixed threshold levels during the computer processing were eliminated. The identification of peaks as either maneuver- or gust-induced was facilitated by observing that either or both of the stick position traces always deflected before a maneuver-induced peak.

The criterion for selecting the stick position peaks to be read was those peaks which rose and fell 10 percent of full stick travel and which measured at least 10 percent above or below the normal values. These normal values depended on the mission segment. For the steady-state mission segment, the normal values were the steady values of the stick positions just before and after the peak value. For the three transient mission segments (where there were no "steady" stick positions), an arbitrary set of normal values was chosen to approximate the stick positions during hover. The selected values are listed by aircraft serial number in Table I.

TABLE I
STICK POSITION SELECTED VA JUES

Aircraft No.	Long. Cyclic Normal (pct)	Collective Normal (pct)
416	42.5	42.9
417	49.9	52.2
418	59.2	46.0
902	54.2	47.7
907	54.7	46.5
916	53.6	39.1

In addition to the foregoing editing, all traces except those for the steady stick positions were marked at each instant of an acceleration or stick position peak during the transient mission segments. Because of the unsteady state prevailing during the three transient mission segments, no elapsed time was associated with these readings; the traces marked here were read only to provide corresponding parameter values in tabulations of the peak values. During the steady-state mission segment, however, all traces except that for acceleration were marked at critical points to permit an adequate time-history representation of the parameters. Consequently, the elapsed time at each steady flight condition and the steady-state par meter values corresponding to the peaks were tabulated.

DATA READING AND QUALITY CONTROL

All edited data points were measured on semiautomatic oscillogram readers, and the measurements were transcribed directly to punched cards. When all data were extracted from a flight, a printout of the cards was given to the Quality Control Section for preliminary data checking. Using standard quality control techniques, this section manually remeasured random points comprising an adequate sample, compared these measurements with those produced by the semiautomatic readers, and established mean and standard deviations from the differences between the two sets of readings to determine and control the desired reading accuracy. Any flights whose measurements did not meet the accuracy standards were reread by the semiautomatic readers. In

addition to the attainment of accurate values, uniformity was obtained in the interpretation and measurement of the traces.

When all data had been processed, the mean and standard deviations were calculated for the entire data sample. If a normal distribution of reading errors is assumed, 99.7 percent of the reading should be within three standard deviations of the true values. Based on average calibration values, Table II shows the mean deviation and the three standard deviations for each parameter.

TABLE II
QUALITY CONTROL VALUES FOR EACH PARAMETER

Parameter	Mean Deviation	Three Standard Deviations (99.7% Accuracy Limit)
Normal Load Factor, g	.0009	± .046
Airspeed, knots*	-0.04	± 2.1
Altitude, feet**	-1.5	± 63
Outside Air Temperature,	°F 0.05	± 2.2
Rotor, rpm	-0.08	± 3.3
Long. Cyclic Stick, percer	-0.12	± 3.1
Collective Stick, percent	-0.13	± 3.2

^{*}Computed at a 90-knot indicated airspeed

DATA COMPUTATIONS

The normal load factor, n_z , was read directly from the normal acceleration trace. To present positive and negative peaks conveniently, an incremental normal load factor, Δn_z , was derived from each n_z peak by using the relation

$$\Delta n_z = n_z - 1.0.$$

^{**}Computed at a 1000-foot density altitude and standard temperature

Since density altitude is formally used in describing helicopter performance, it was calculated from the following equation (see Reference 5):

$$h_d = 145,300 \left[1 - \left(\frac{518.4 p_a}{29.92 \text{ OAT} + 13,745.2} \right)^{0.235} \right].$$

Only indicated airspeeds are given, since the instrument installation correction to derive the calibrated airspeed was not considered to be substantial enough to improve appreciably the accuracy of the indicated airspeed. For airspeeds below 110 knots, the correction is less than 4.6 knots; in addition, it depends on the thrust conditions of the rotor, such as those during hover and full power climb.

Rotor rpm and outside air temperature were computed by applying linear calibrations to the trace measurements. With the displacements of the stick position traces representing the deflections of the longitudinal cyclic stick from the full-forward position and the deflections of the collective stick from the full-down position, the respective stick positions were computed from the trace measurements in units of percent of full deflection. By an approximate differentiation of the altitude trace, the rate of climb was computed continuously during the steady-state mission segment and at each position stick or acceleration peak during the three transient mission segments. At the same times that the rate of climb was computed, the "longitudinal acceleration," or rate of change of airspeed, was derived by an approximate differentiation of the airspeed trace.

Two nondimensional parameters, the rotor tip speed ratio, (μ), and the ratio of the thrust coefficient, (C_T), to the rotor solidity, (σ), were calculated as follows. With a consistent system of units employed, μ was calculated as a nondimensional parameter from the following expression:

$$\mu = \frac{V}{\Omega R} .$$

The thrust coefficient ratio was calculated as a nondimensional parameter from the following expression:

$$C_{\rm T}/\sigma = \frac{W}{\rho \pi R^2 (\Omega R)^2 \sigma} .$$

DATA RESULTS

The processed data representing the 165 hours of valid flight data are presented in the form of tables, histograms, and exceedance curves. The histograms and some types of tables show the flight time spent in ranges of one parameter versus ranges of a second parameter. With the exception of Table III, which distributes the total flight time among the four mission segments to illustrate the mission segment time versus gross weight, the times given are those covering the steady-state mission segment only. Other types of tables show for a parameter the number of its peaks falling within both given ranges of this parameter and those of a second parameter. For jurther data breakdowns, some of both types of tables are related to the single range of a third and a fourth parameter. As mentioned before, the exceedance curves indicate the number of hours required to equal or exceed a given parameter value.

Figures 2 through 17 are histograms showing the percentages of flight time spent in ranges of various parameters. Except for Figures 2 and 3, which are based on the total flight time, the time given covers the steady-state mission only. Figure 2, giving the percentage of total flight time spent in each mission segment, shows that the time expended in the steady-state and maneuver mission segments was 65 and 6-1/2 percent, respectively. The fact that the CH-47A is primarily a cargo and personnel carrier not requiring extensive maneuvering explains the relatively short time spent in the maneuver mission segment. With a distribution similar to that shown in Figure 2, Figure 3 shows for each gross weight range the percentage of time spent in the mission segment. As apparent, the gross weight does not appreciably affect the time spent in each mission segment.

Figure 4, which gives the percentage of steady-state time spent in each gross weight range, shows that 54 percent of this time was spent in the 20,000- to 22,000-pound range. The maximum takeoff gross weight in the recorded data is 33,923 pounds. As indicated in Figure 5, more than 40 percent of the steady-state flight time was spent at density altitudes below 1000 feet; no steady-state flight time was spent above 5000 feet.

Figure 6 shows that 88 percent of the steady-state time was spent in the rotor rpm range between 230 and 240 rpm. The theoretical maximum power-on rotor rpm permitted for this belicopter is 230 rpm. As shown

in Figure 7, the outside air temperature was between 50° F and 80° F more than 70 percent of the steady-state flight time and below 30° F only 3-1/2 percent of this time.

Figure 8 shows the percentage of steady-state time spent in rate-ofclimb ranges. More than 97 percent of the time was within the range of -500 to +500 feet per minute. Although no rates less than -1500 feet per minute or more than +1500 feet per minute were recorded during the steady-state missions, higher descent or climb rates may have occurred during the transient mission segments.

As shown in Figure 9, which distributes the steady-state flight time among the various airspeed ranges, no airspeed exceeding 135 knots was recorded. For combinations of airspeed and altitude ranges, Figures 10 through 17 show the percentage of steady-state time spent in gross weight ranges. At the gross weight ranges between 20,000 and 24,000 pounds, which included nearly 75 percent of the total steady-state flight time, the distribution of time in the altitude-airspeed blocks is very uniform. Except for airspeeds below 40 knots, which occurred mostly below a 1000-foot density altitude, no given airspeed may be associated with a specific density altitude. At the higher gross weights, the steadystate flight time was spent mainly above 1000 feet. However, at gross weights above 32,000 pounds, no time was recorded at density altitudes higher than 2000 feet. For gross weights above 24,000 pounds, only 10.8 minutes of steady-state flight time was recorded at airspeeds above 125 knots. Since the airspeed in more than 59 percent of the steady-state flight time was between 60 and 100 knots, the normal cruise airspeed for the CH-47 is obviously within this range.

The exceedance curves in Figures 18, 19, and 20, which include both positive and negative increments, show the number of hours to reach or exceed a given incremental maneuver load factor. These figures represent the composite data and mission segment and gross weight breakdowns. Although the steady-state and descent mission segments incurred the highest values, the maneuver mission segment had the highest frequency of values. The high maneuver incremental load factors occurred at gross weights below 22,000 pounds. While the steady-state mission segment exceedance curves for positive and negative increments are very similar, the frequency of the positive value is slightly higher. Since the number of data points at gross weights above 24,000 pounds is small, the plots at these weights should be considered as trends only. The curve for the composite data in Figure 20 shows that the positive incremental values occurred more frequently than the negative values. Again, the portion of the curve at the larger incremental values where few points were plotted should be interpreted as revealing a trend only. Figure 21

shows a tabulation and a plot of maneuver normal load factors versus rotor tip speeds.

Figures 22, 23, and 24 show exceedance curves for incremental gust normal load factors. As with the figures for maneuver values, these figures give curves for the composite data and the mission segment and gross weight breakdowns. The close similarity of the gust spectra for the ascent and descent missions was due to the low altitudes generally prevailing during these missions. A comparison of the data shows that the steady-state mission segment generally had a more severe gust environment. However, this observation should be qualified somewhat, since some gusts occurring during the transient mission segments may have been lost because of the editing criterion of identifying a peak as being caused by a maneuver whenever a stick position trace deviated before an acceleration peak. As evidenced in the gross weight breakdown, the gross weight variation did not significantly affect the gust spectrum. This variation, however, was very limited in the extreme weight ranges, since most of the time was spent in the 20,000- to 24,000-pound gross weight range. Figure 25 is a tabulation and a plot of gust normal load factors versus indicated airspeed ranges.

Of interest is the comparison of the gust spectrum for the CH-47A tandem-rotor helicopter with that for the CH-54A single-rotor helicopter. Data for the two spectra were obtained generally during the same period and over the same geographic area. Both helicopters have gross weights of over 20,000 pounds, the maximums for the CH-47A and CH-54A being about 38,000 and 45,000 pounds, respectively. The comparison of the composite data exceedance curve in Figure 22 for the CH-47A with that in Figure 26 for the CH-54A (reported in Reference 3) shows that the CH-54A incurred a slightly higher frequency of lower magnitude gusts.

CONCLUSIONS

It is concluded that:

- 1. The significant load spectrum derived from the CH-47A flight loads data evidences the technical feasibility of conducting flight loads programs on helicopters.
- 2. The correlation of the gust- and maneuver-induced load factors demonstrates the practicality of identifying the cause of acceleration peaks according to the characteristic patterns in the stick position traces.
- 3. None of the instrumented CH-47A helicopters exceeded the design load factor limit of 2.67, since the highest recorded factor was 1.62.

REFERENCES

- 1. OV-1A Mohawk Flight Loads Investigation Program, USAAVLABS

 Technical Report 66-6, U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, January 1966.
- 2. UH-1B Helicopter Flight Loads Investigation Program, USAAVLABS
 Technical Report 66-46, U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, May 1966.
- 3. CH-54A Skycrane Helicopter Flight Loads Investigation Program,
 USAAVLABS Technical Report 66-58, U. S. Army Aviation
 Materiel Laboratories, Fort Eustis, Virginia, June 1966.
- 4. CH-47A Category II Stability and Control Tests, Technical Documentary Report 64-24, Air Force Flight Test Center, Edwards Air Force Base, California, October 1964.
- 5. Von Mises, Richard, Theory of Flight, McGraw-Hill Book Company, Inc., New York, New York, 1945, p. 11.

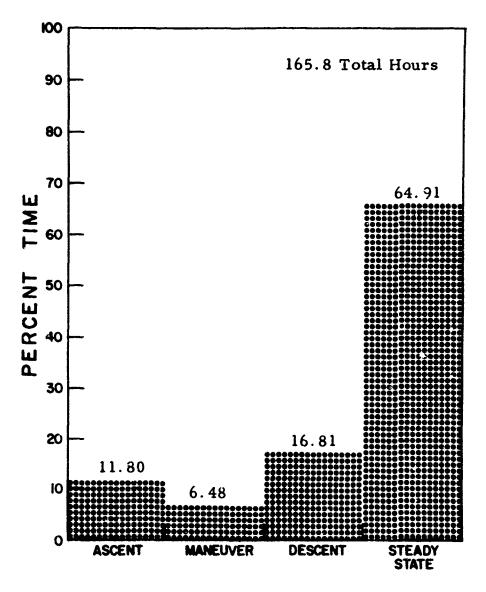
DISTRIBUTION

US Army Materiel Command	5
US Army Aviation Materiel Command	6
US Army Aviation Materiel Laboratories	29
US Army R&D Group (Europe)	2
US Army Limited War Laboratory	1
US Army Human Engineering Laboratories	1
US Army Research Office-Durham	1
US Army Test and Evaluation Command	1
Plastics Technical Evaluation Center	1
US Army Medical R&D Command	1
US Army Engineer Waterways Experiment Station	1
US Army Combat Developments Command, Fort Belvoir	2
US Army Combat Developmen's Command Experimentation Command	3
US Army War College	ì
US Army Command and General Staff College	1
US Army Aviation School	1
US Army Infantry Center	2
US Army Tank-Automotive Center	2
US Army Aviation Maintenance Center	2
US Army Armor and Engineer Board	1
US Army Electronics Command	2
US Army Aviation Test Activity	2
Air Force Flight Test Center, Edwards AFB	2
US Army Field Office, AFSC, Andrews AFB	1
Air Force Flight Dynamics Laboratory, Wright-Patterson AFB	1
Systems Engineering Group (RTD), Wright-Patterson AFB	3
Bureau of Ships, DN	1
Bureau of Naval Weapons, DN	6
Chief of Naval Research	5
David Taylor Model Basin	1
Commandant of the Marine Corps	1
Testing and Development Division, US Coast Guard	1
Ames Research Center, NASA	1
Lewis Research Center, NASA	1
Manned Spacecraft Center, NASA	1
NASA Representative, Scientific and Technical Information Facility	2
NAFEC Library (FAA)	2
US Army Aviation Human Research Unit	2
US Army Board for Aviation Accident Research	1

Bureau of Safety, Civil Aeronautics Board US Naval Aviation Safety Center, Norfolk Federal Aviation Agency, Washington, D. C. Bureau of Flight Standards, FAA	2
	1
	1
	1
Civil Aeromedical Research Institute, FAA	2
The Surgeon General	1
Defense Documentation Center	20

APPENDIX I

ILLUSTRATIONS



MISSION SEGMENT

Figure 2. Percentage of Total Flight Time in Each Mission Segment

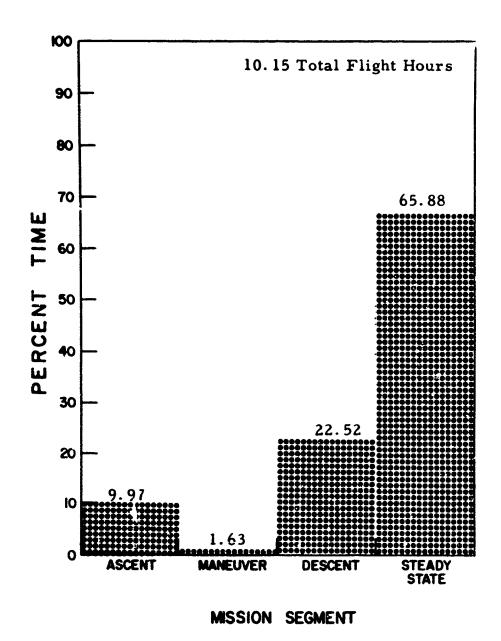


Figure 3. Flight Time in Each Gross Weight Range Broken Down by Percentage of Time in Each Mission Segment

(a) Gross Weight Less Than 20,000 Pounds

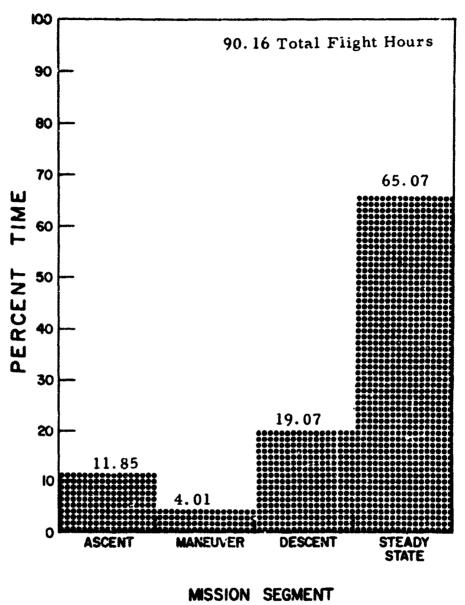


Figure 3. (b) Gross Weight 20,000 to 22,000 Pounds

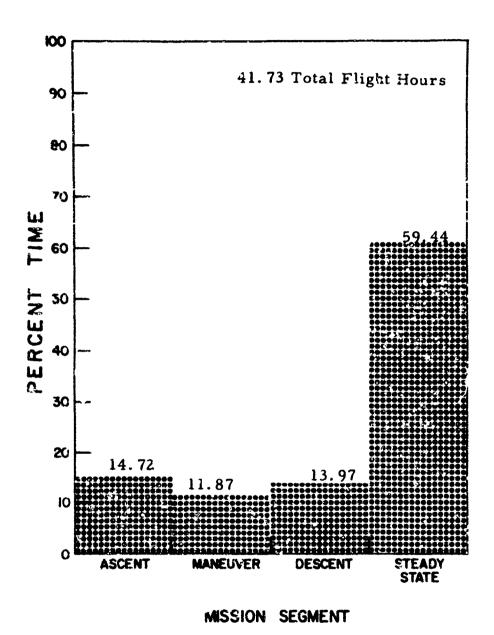


Figure 3. (c) Gross Weight 22,000 to 24,000 Pounds



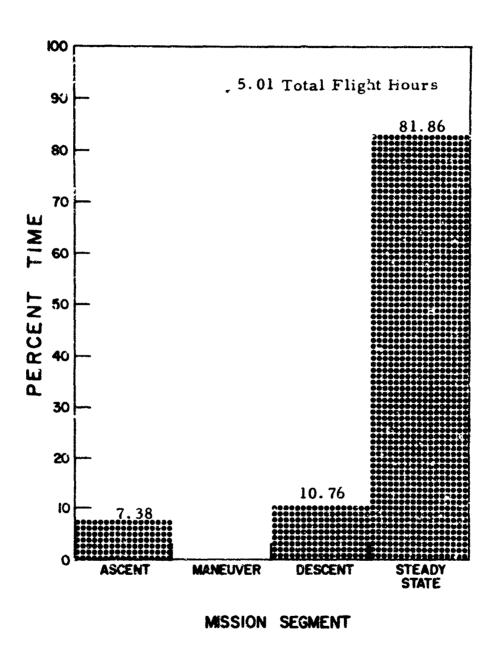


Figure 3. (d) Gross Weight 24,000 to 26,000 Pounds

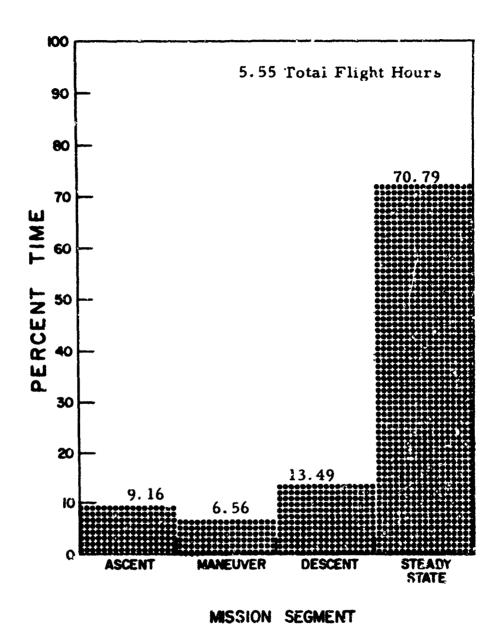


Figure 3. (e) Gross Weight 26,000 to 28,000 Pounds

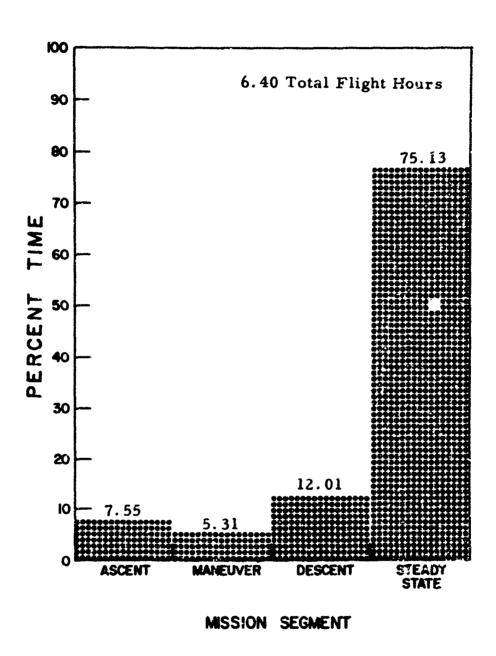


Figure 3. (f) Gross Weight 28,000 to 30,000 Pounds

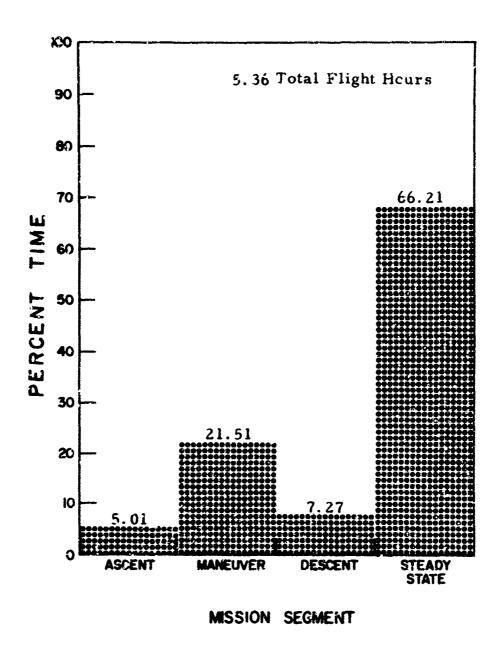


Figure 3. (g) Gross Weight 30,000 to 32,000 Pounds

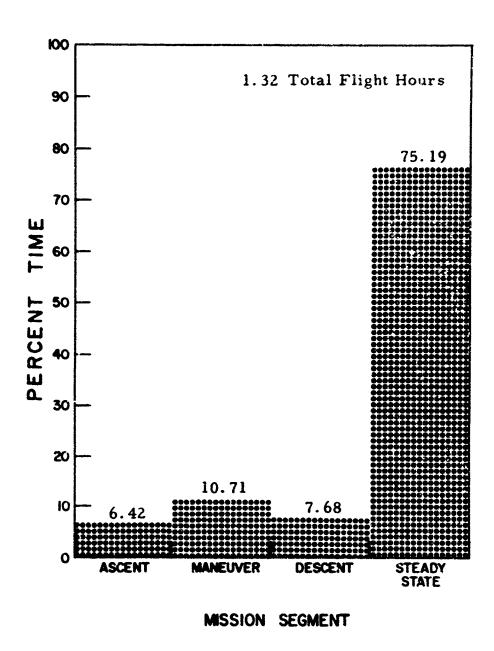
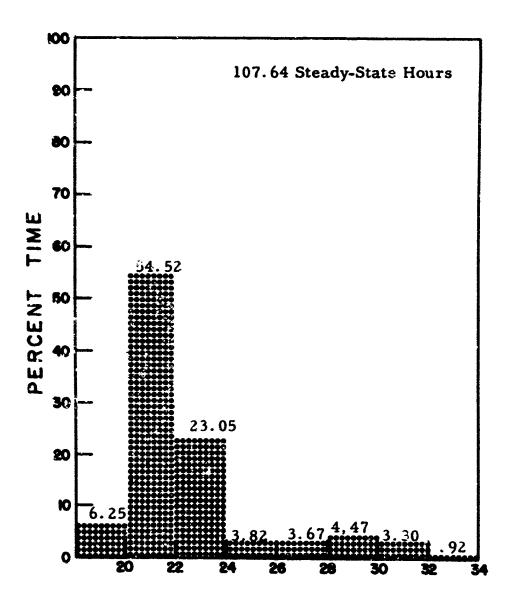
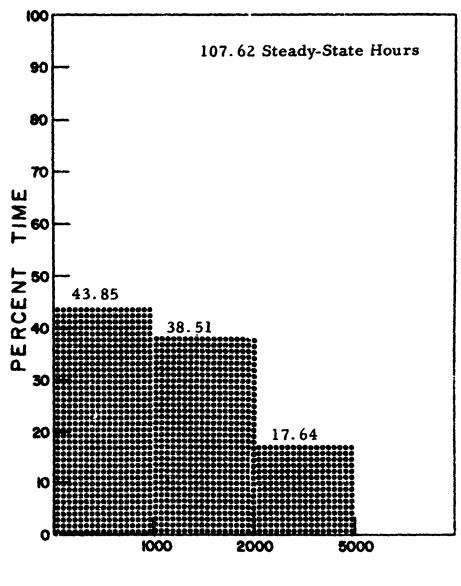


Figure 3. (h) Gross Weight 32,000 to 34,000 Pounds



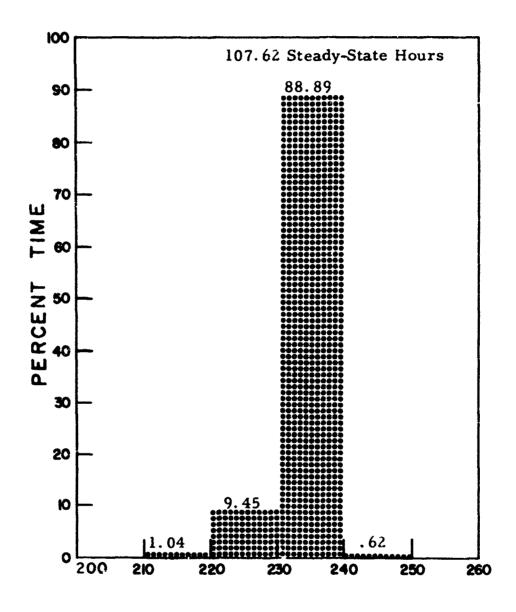
GROSS WEIGHT IN THOUSANDS OF POUNDS

Figure 4. Percentage of Steady-State Mission Segment Flight Time in Each Gross Weight Range

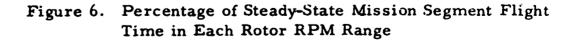


DENSITY ALTITUDE, FT.

Figure 5. Percentage of Steady-State Mission Segment Flight
Time in Each Density Altitude Range



ROTOR REVOLUTIONS PER MINUTE



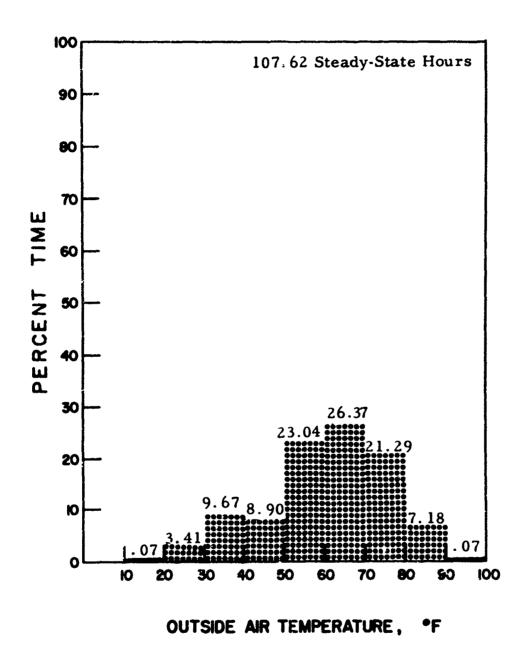
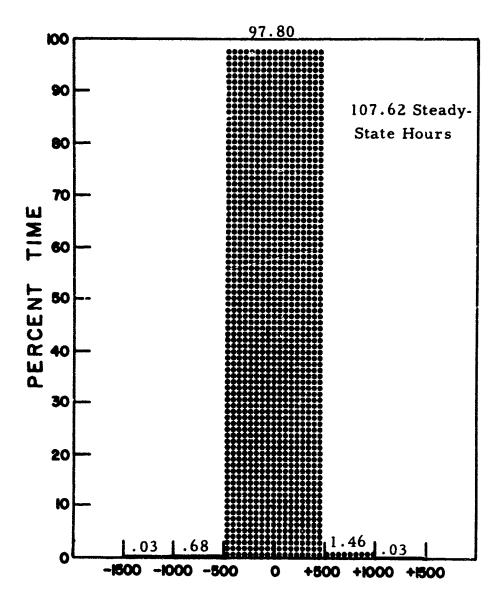
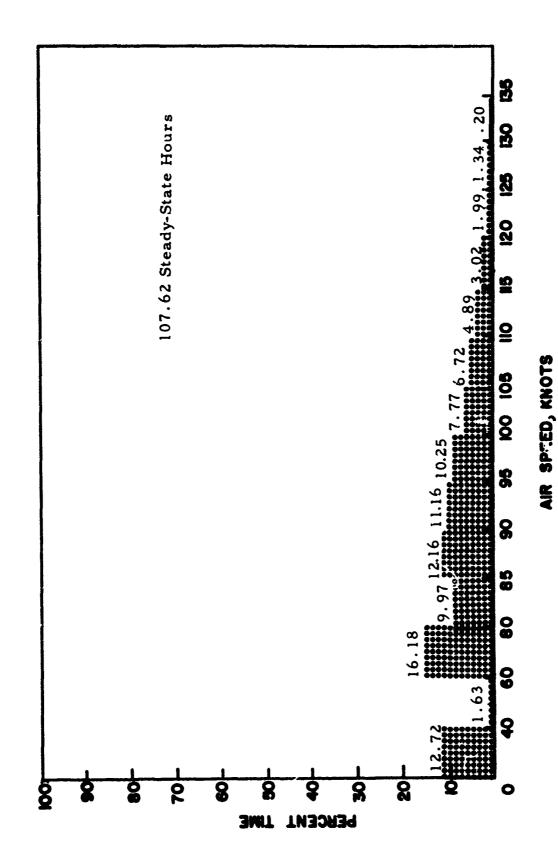


Figure 7. Percentage of Steady-State Mission Segment Flight
Time in Each Outside Air Temperature Range



RATE OF CLIMB, FT/MIN

Figure 8. Percentage of Steady-State Mission Segment Flight Time in Each Rate of Climb Range



Percentage of Steady-State Mission Segment Flight Time in Each Airspeed Range Figure 9.

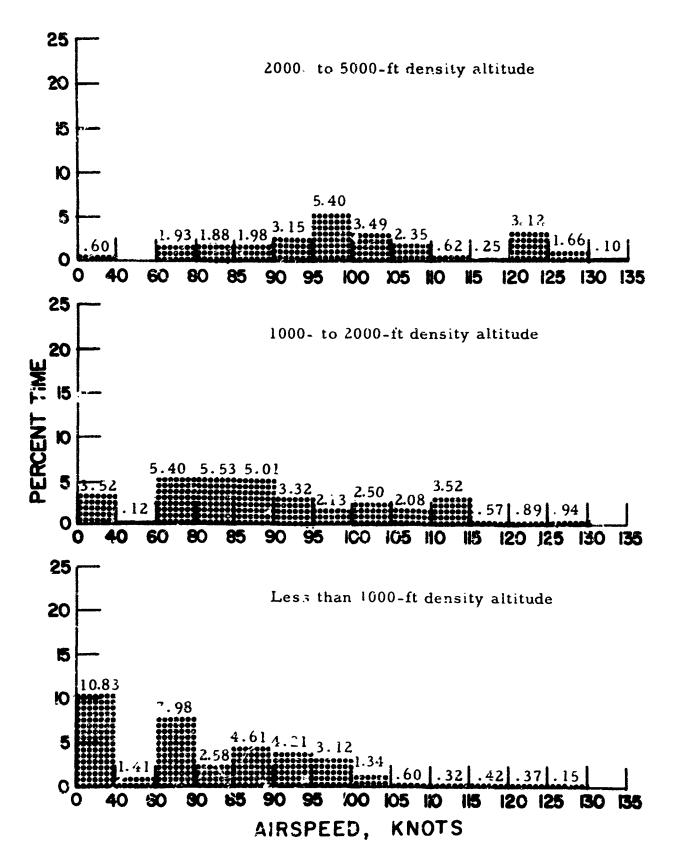


Figure 10. Time in Steady-State Mission Segment in Less Than 20,000-Pound Gross Weight Range Broken Down by Fercentage of Time in Each Density Altitude-Airspeed Range

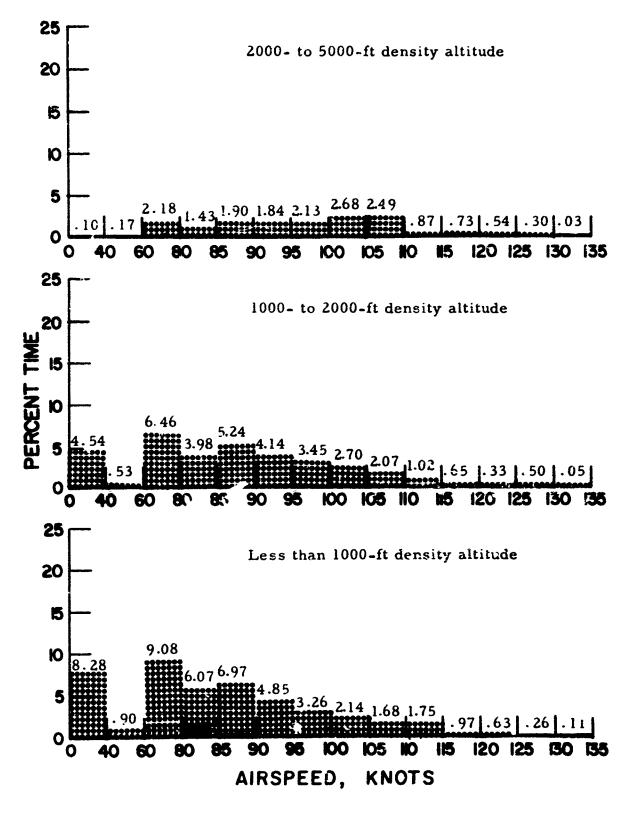


Figure 11. Time in Steady-State Mission Segment in 20,000to 22,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

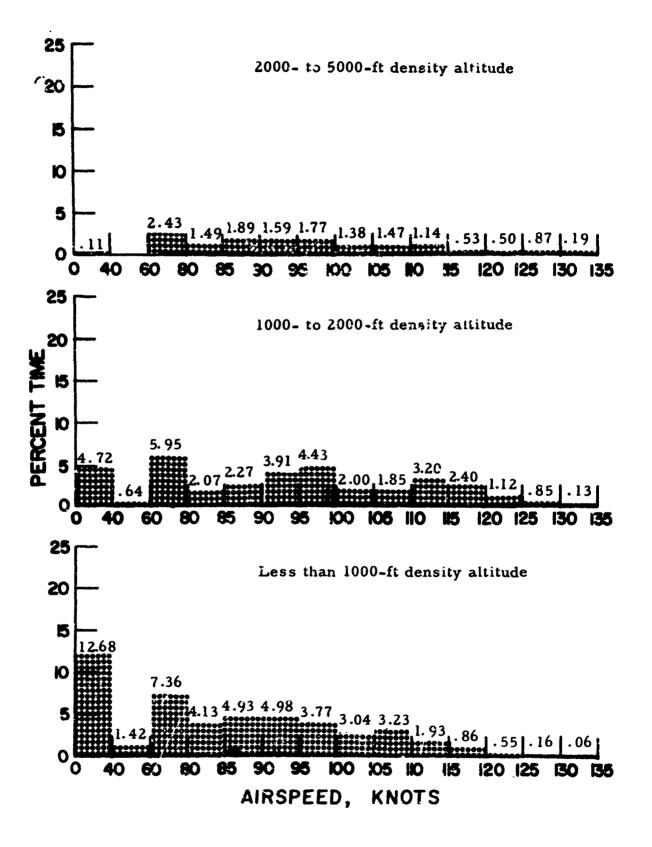


Figure 12. Time in Steady-State Mission Segment in 22,000- to 24,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Donsity Altitude-Airspeed Range

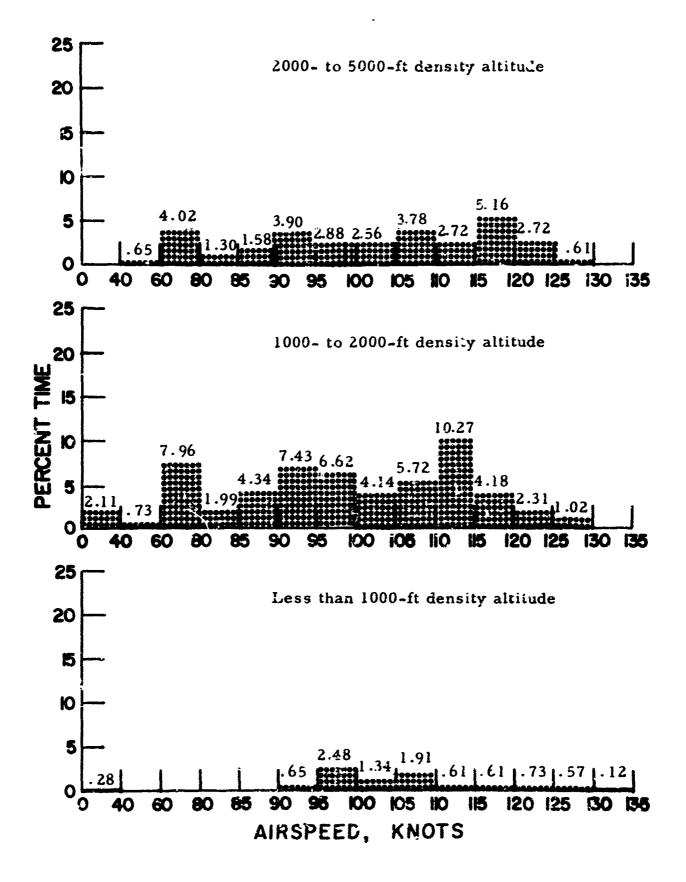


Figure 13. Time in Steady-State Mission Segment in 24,000to 26,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

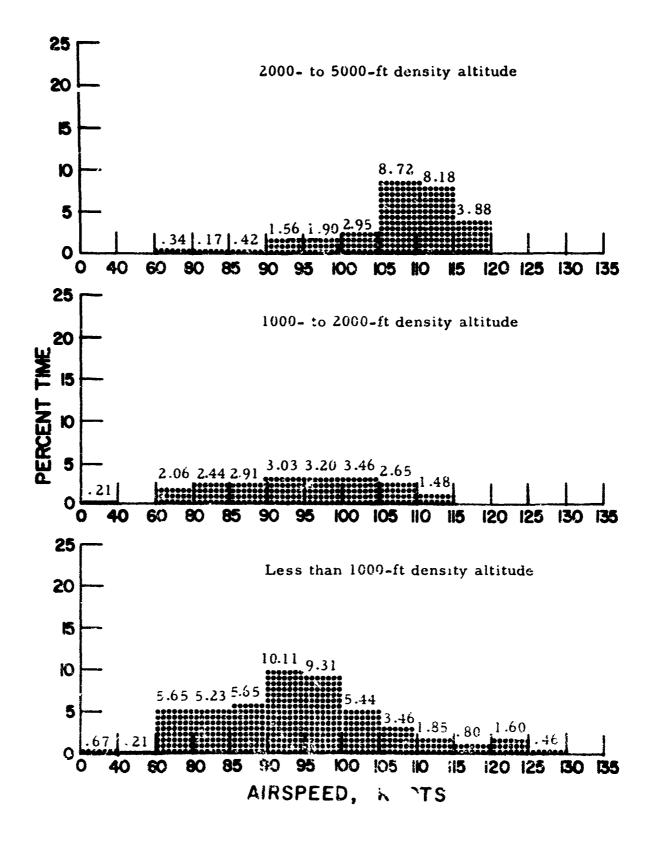


Figure 14. Time in Steady-State Mission Segment in 26,000- to 28,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

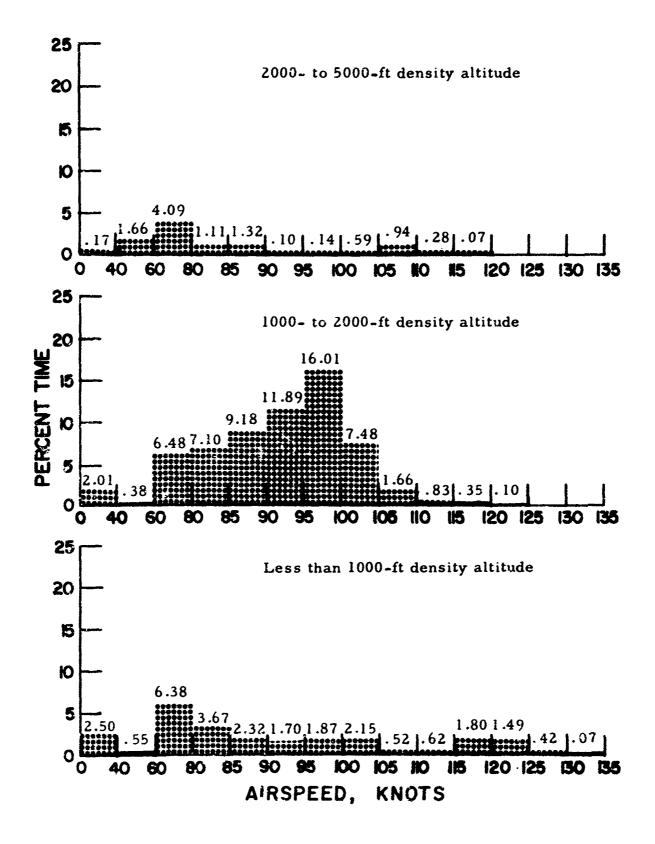


Figure 15. Time in Steady-State Mission Segment in 28,000- to 30,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

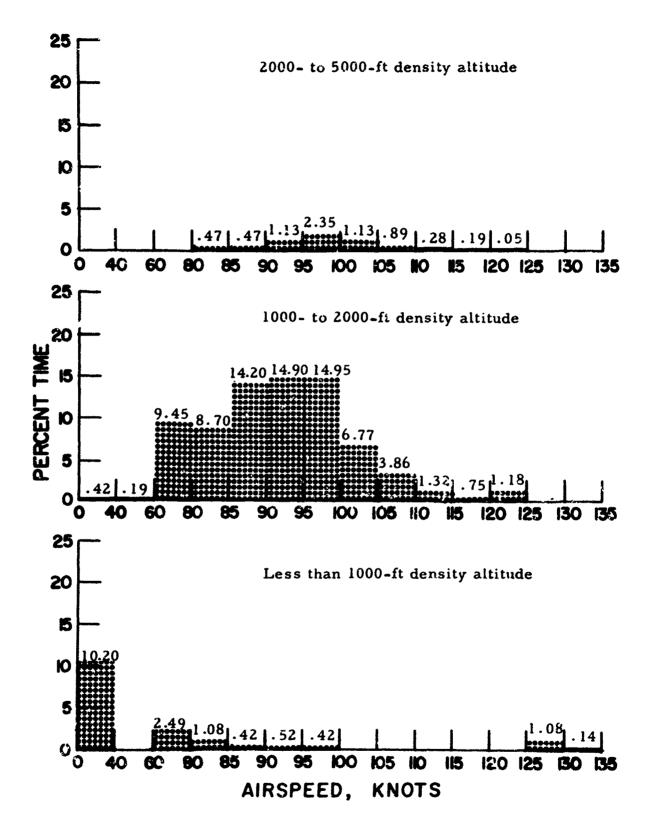


Figure 16. Time in Steady-State Mission Segment in 30, 300- to 32, 000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

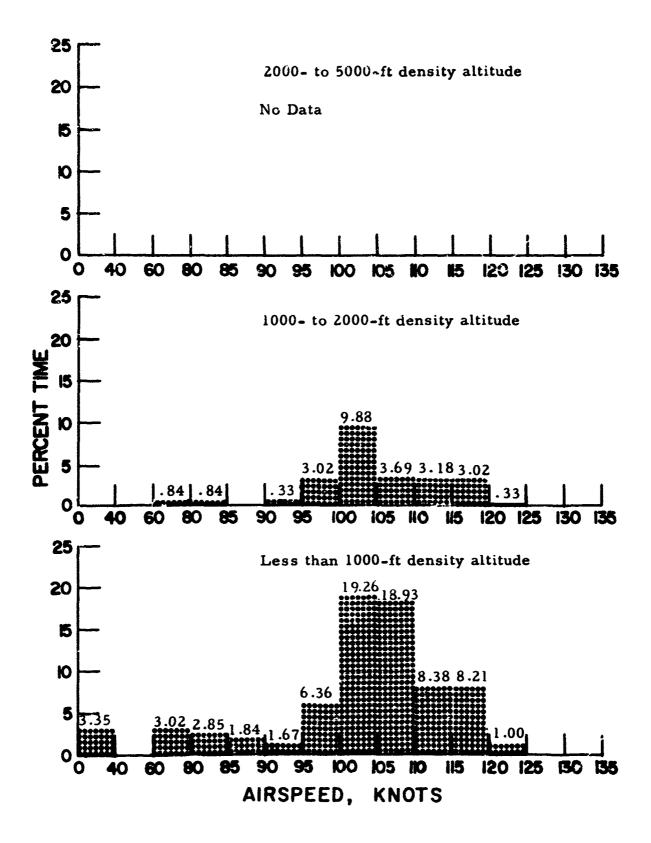


Figure 17. Time in Steady-State Mission Segment in 32,000- to 34,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

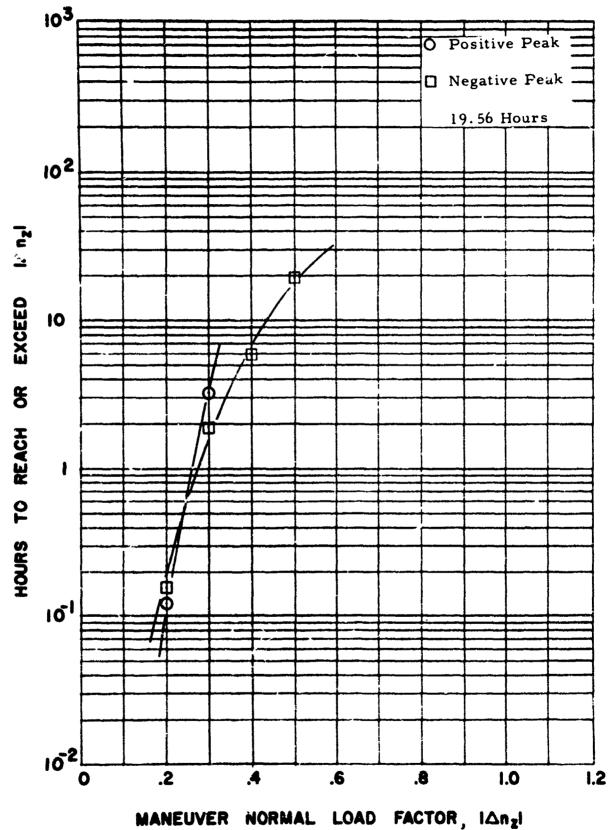


Figure 18. Exceedance Curves for Incremental Maneuver
Normal Load Factor Peaks by Mission Segment

(a) Ascent Mission Segment

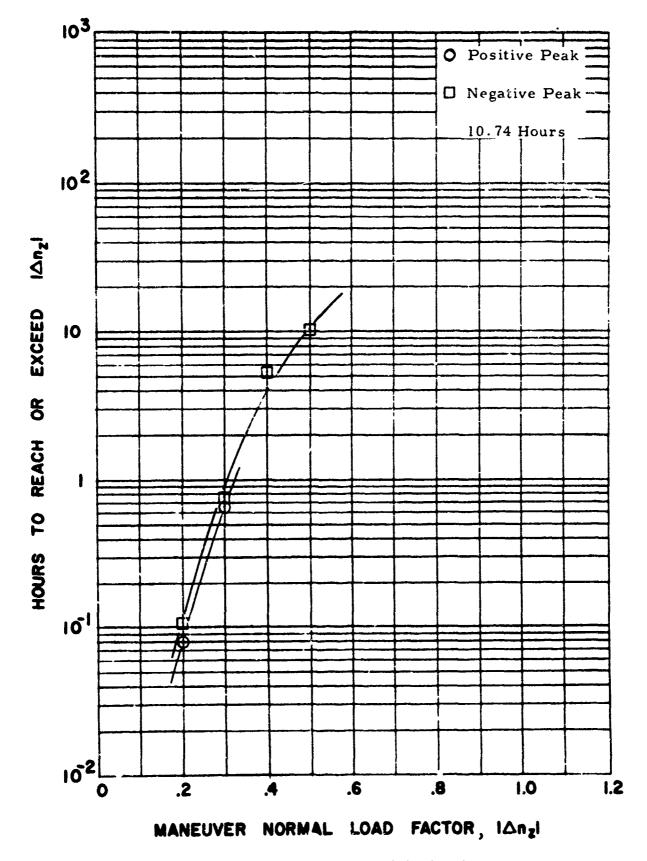


Figure 18. (b) Maneuver Mission Segment

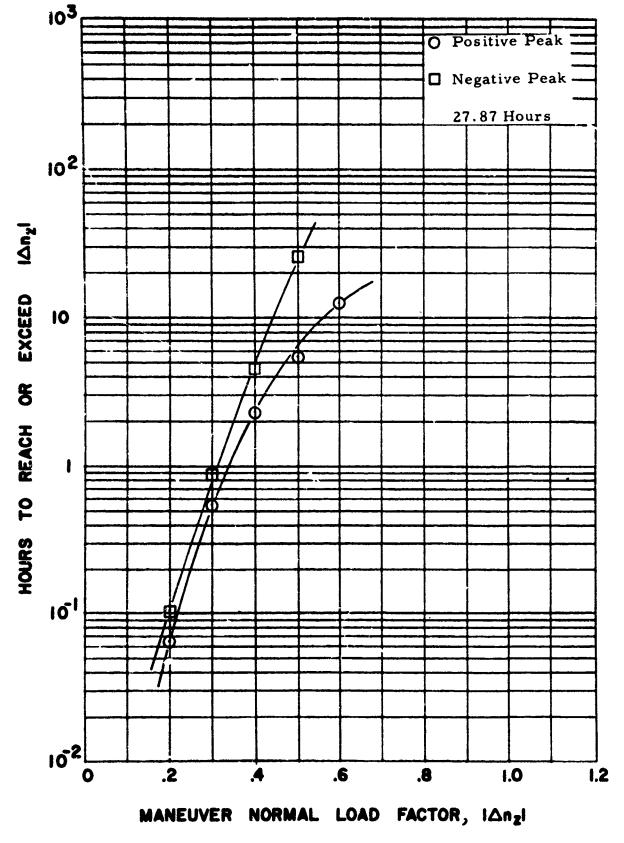


Figure 18. (c) Descent Mission Segment

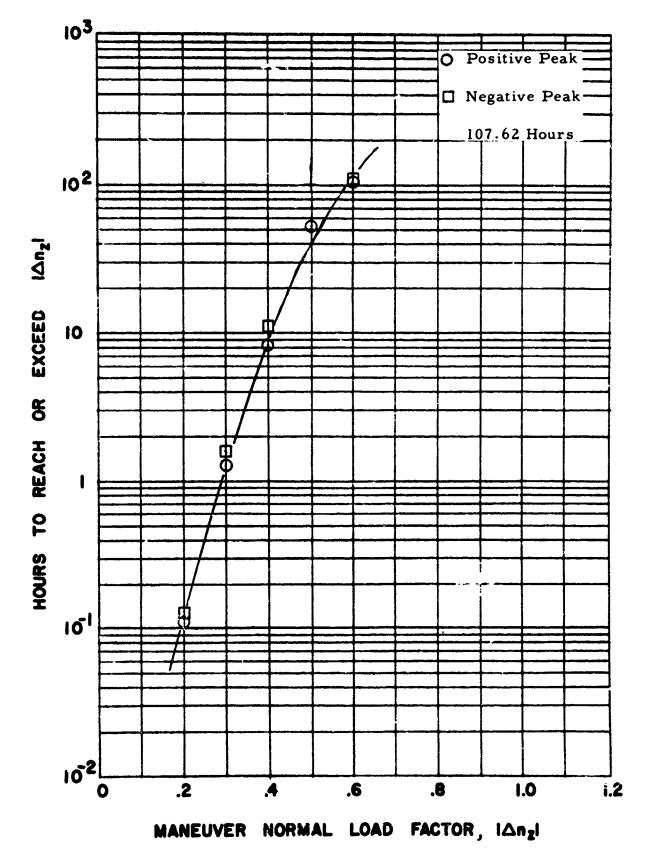


Figure 18. (d) Steady-State Mission Segment

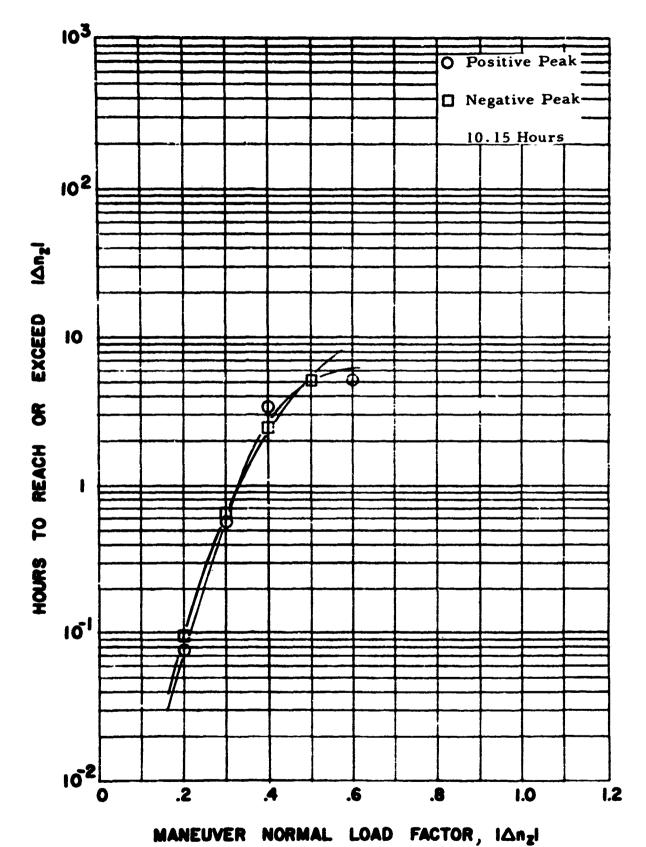
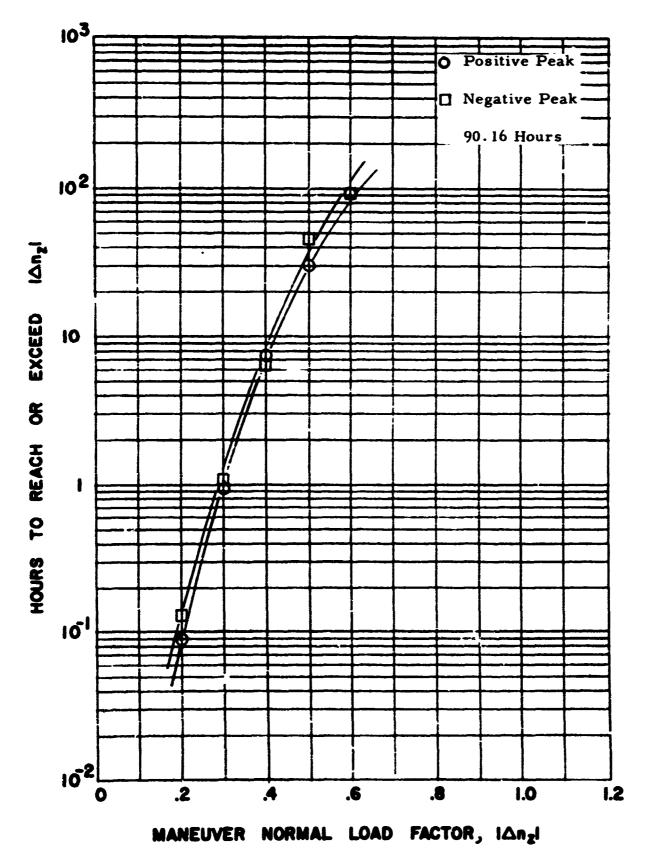


Figure 19. Exceedance Curves for Incremental Maneuver Normal Load Factor Peaks by Gross Weight Ranges

(a) Less Than 20,000 Pounds



ليعجث ا

Figure 19. (b) 20,000 to 22,000 Pounds

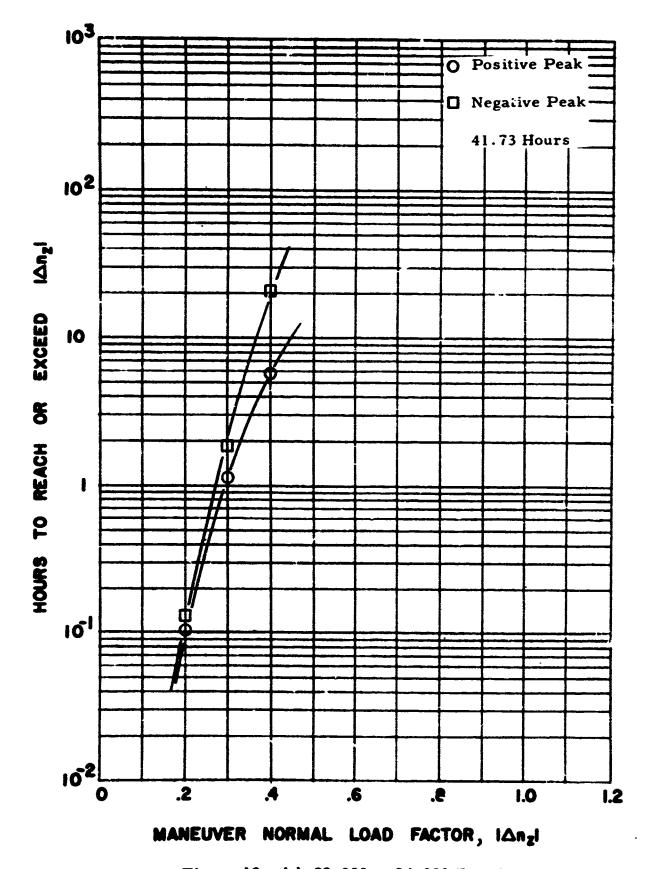


Figure 19. (c) 22,000 to 24,000 Pounds

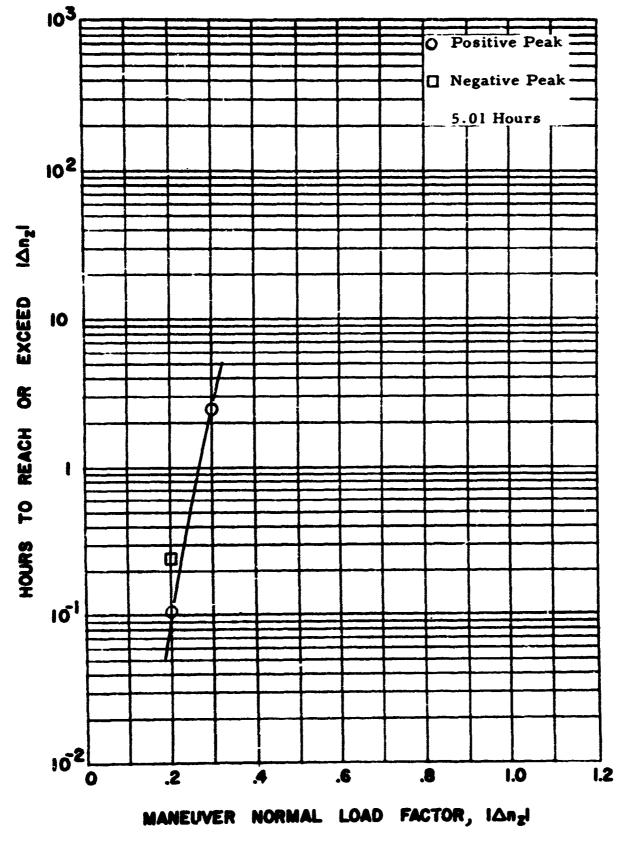


Figure 19. (d) 24,000 to 26,000 Pounds

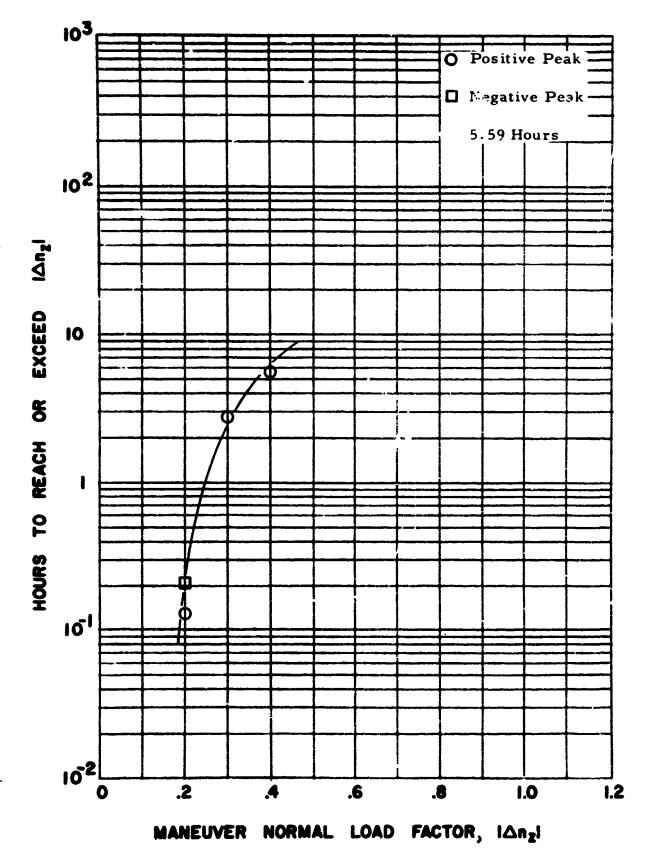
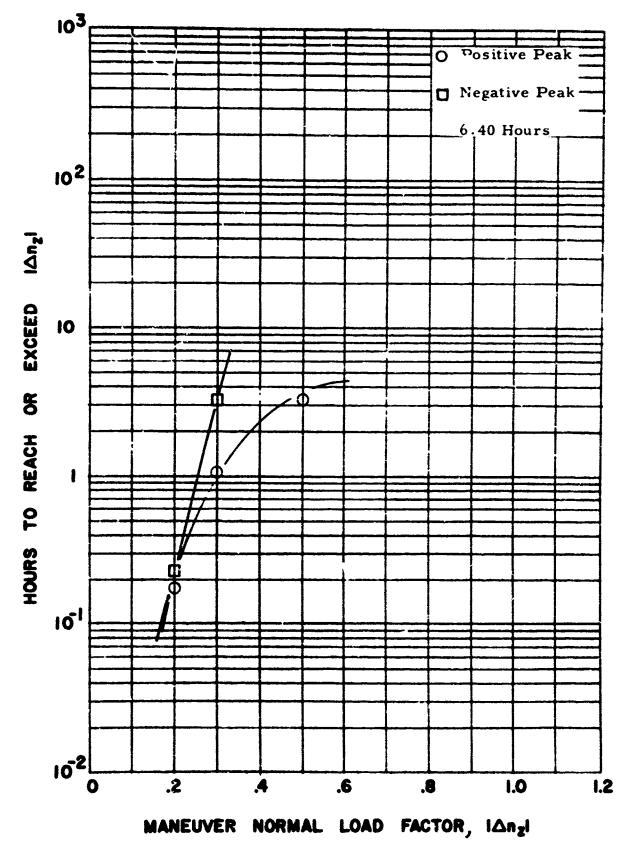


Figure 19. (e) 26,000 to 28,000 Pounds



e Cana

Figure 19. (f) 28,000 to 30,000 Pounds

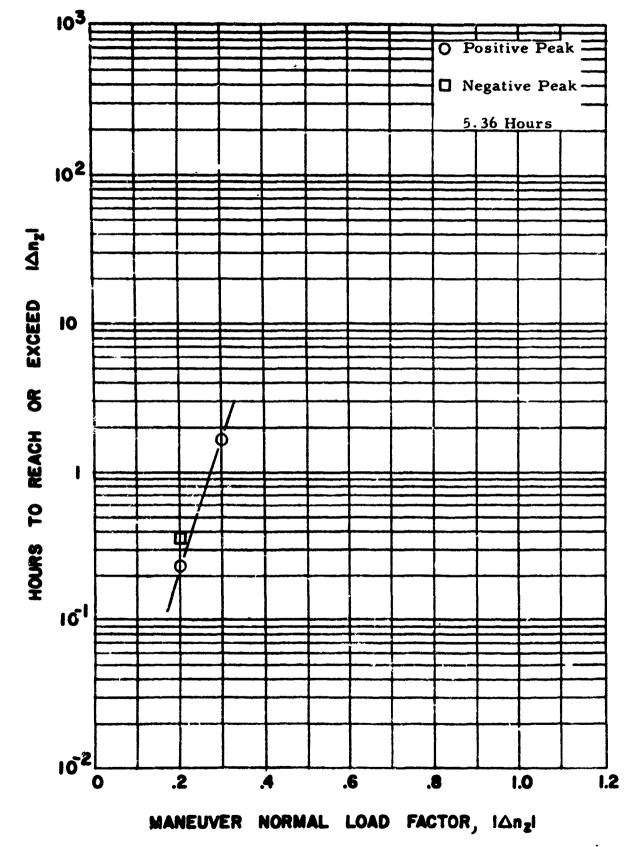


Figure 19. (g) 30,000 to 32,000 Pounds

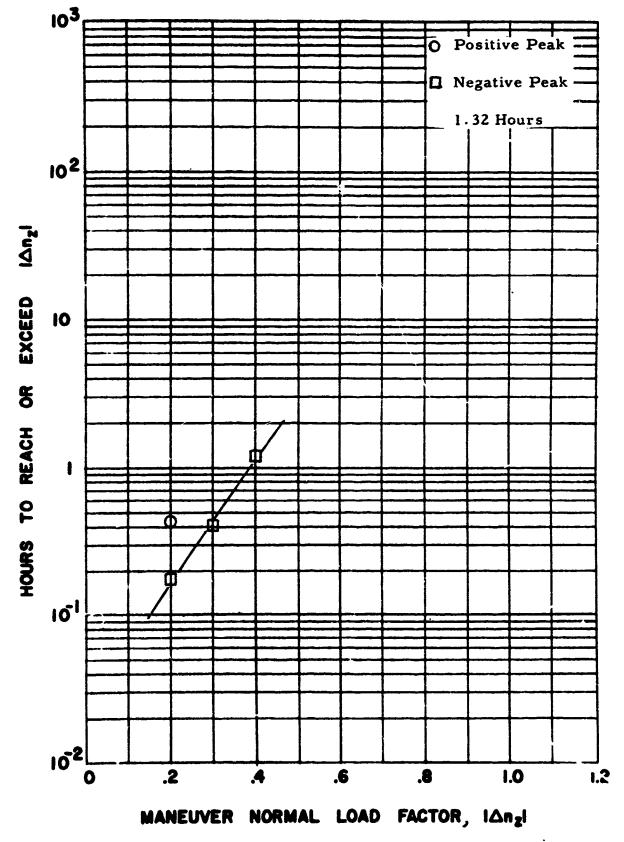


Figure 19. (h) 32,000 to 34,000 Pounds

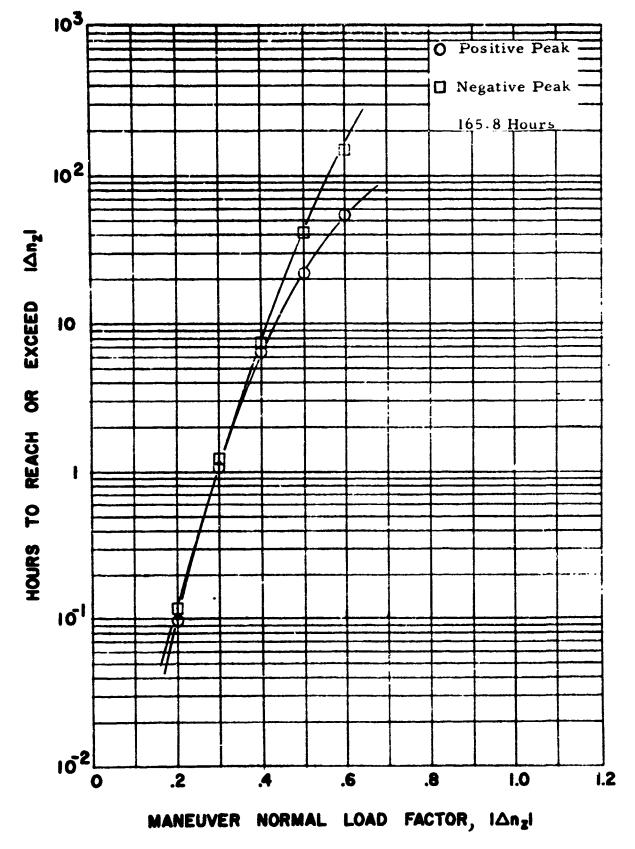
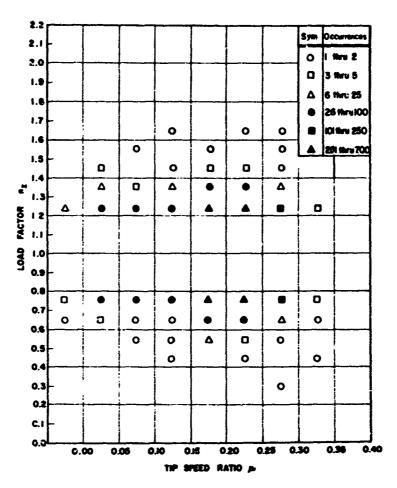


Figure 20. Exceedance Curves for the Composite of Incremental Maneuver Normal Load Factor Peaks



LOAD FACTOR R _Z	TIP SPEED RATIO A									l
	LESS THAM 0.00	0.00	0.05	0.10	0.20	0.20	0.25	0.30	0.35	TOTAL
2.0 10 2.2										
1.9 to 2.0										
18 to 1.9										
1.7 10 1.6										
1.6 to 1.7				ī		ı	1			3
1.5 to 1.6			2		1		1			4
1.4 10 1.5		4		2	5	5	2			18
1.3 to 1.4		•	3	9	38	46	19			123
1.2 tr 1.3	6	62	27	92	433	682	204	5		1511
0.8 to 1.2										
0.7 to 0.5	4	53	34	63	324	507	189	5		1179
06 to 0.7	5	3	2	2	27	45	10	ı		100
0 5 to 0.5			'	1	•	5	2			17
0.4 10 0.5				ı		1		1		3
0.2 to 0.4							1			
0.0 to 0.2										
TOTAL	12	130	69	171	936	1292	437	12		2959

Figure 21. Diagram and Tabulation of Maneuver Normal Load Factor Peaks in Ranges of Rotor Tip Speed Ratio

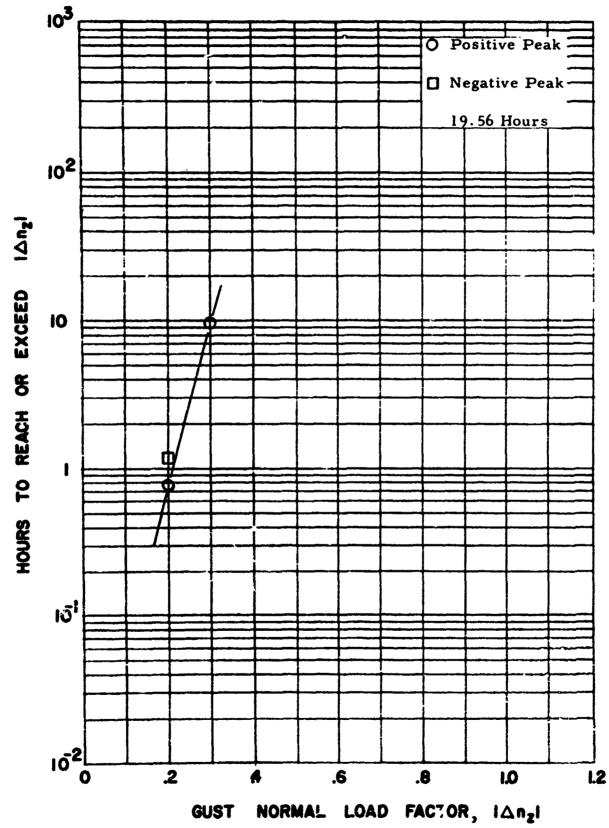


Figure 22. Exceedance Curves for Incremental Gust Normal Load Factor Peaks by Mission Segment

(a) Ascent Mission Segment

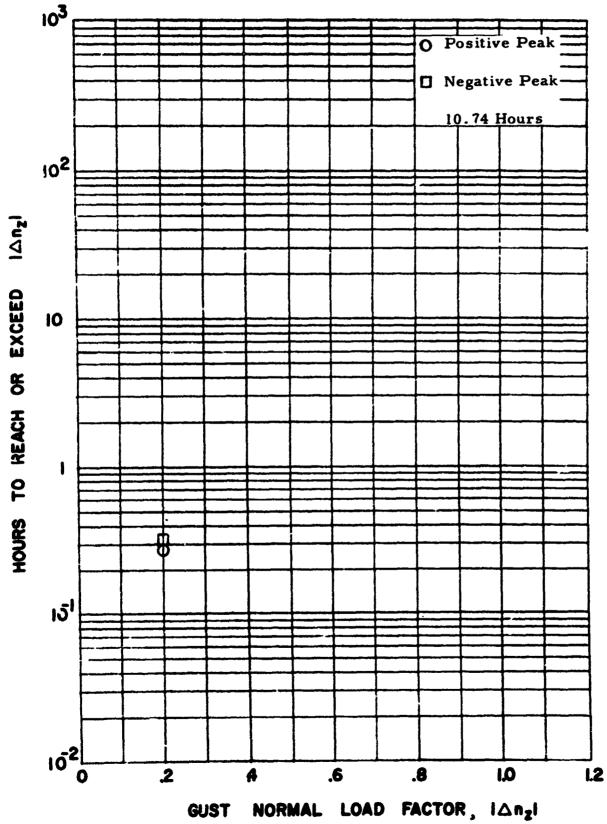


Figure 22. (b) Maneuver Mission Segment

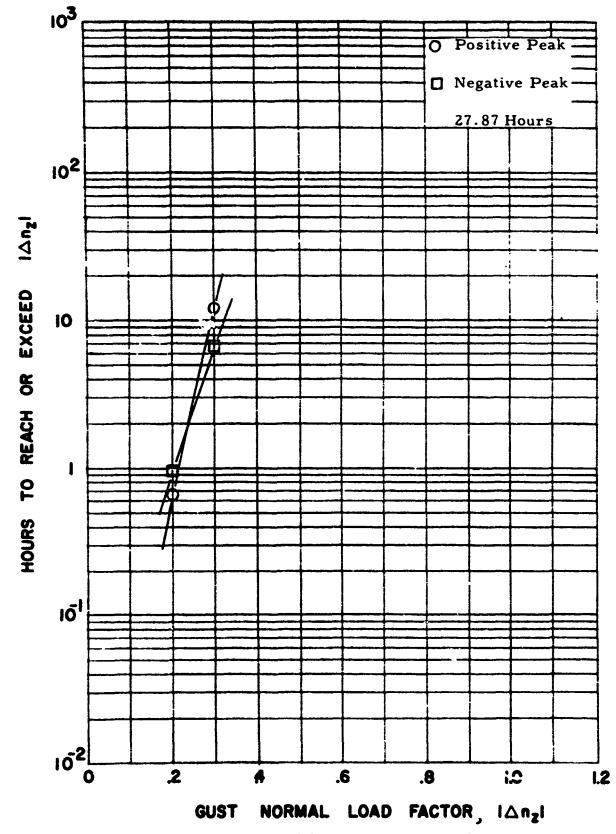
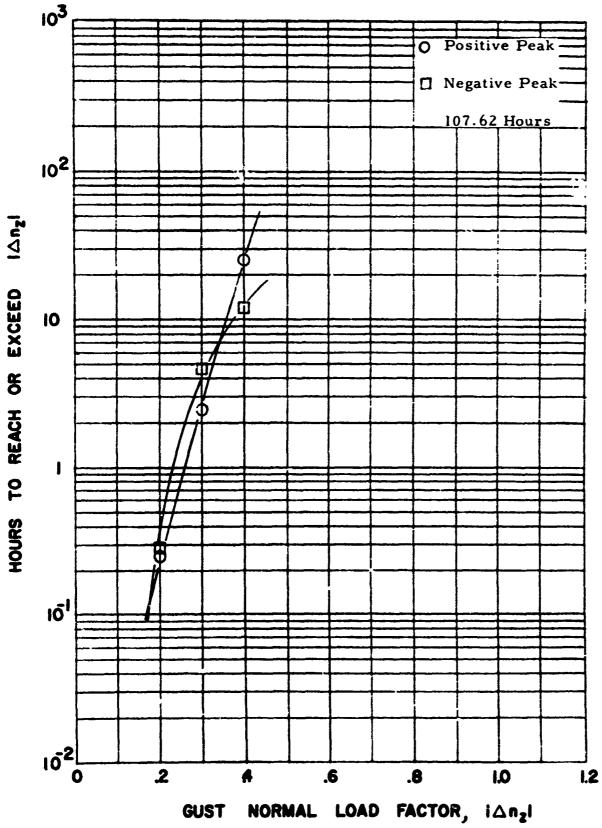


Figure 22. (c) Descent Mission Segment



-14. Same

F.gure 22. (d) Steady-State Mission Segment

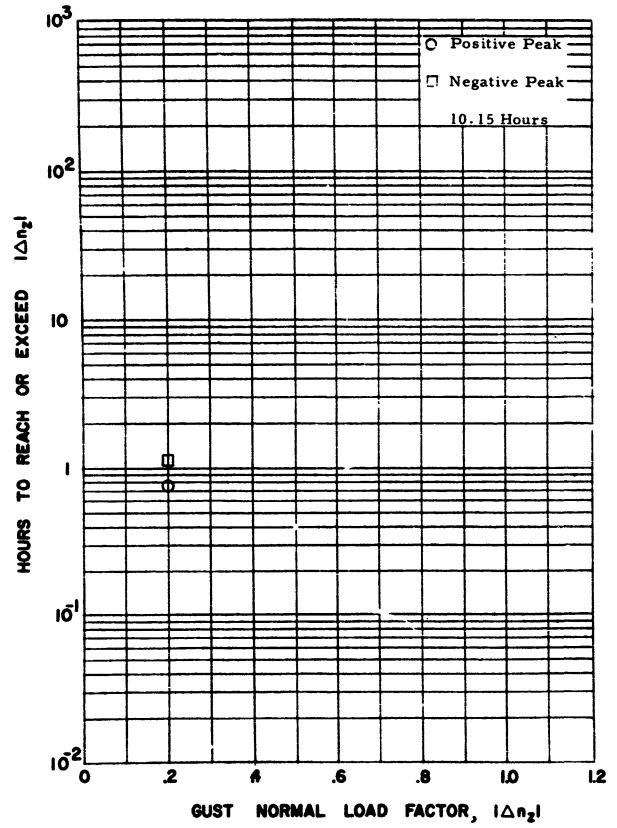
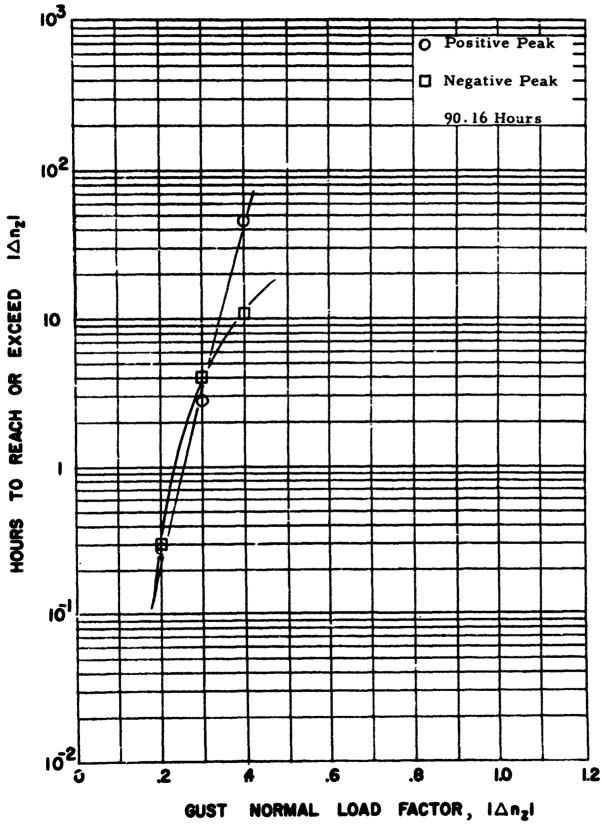


Figure 23. Exceedance Curves for Incremental Gust Normal Load Factor Peaks by Gross Weight Ranges

(a) Less Than 20,000 Pounds



- Sac

Figure 23. (b) 20,000 to 22,000 Pounds

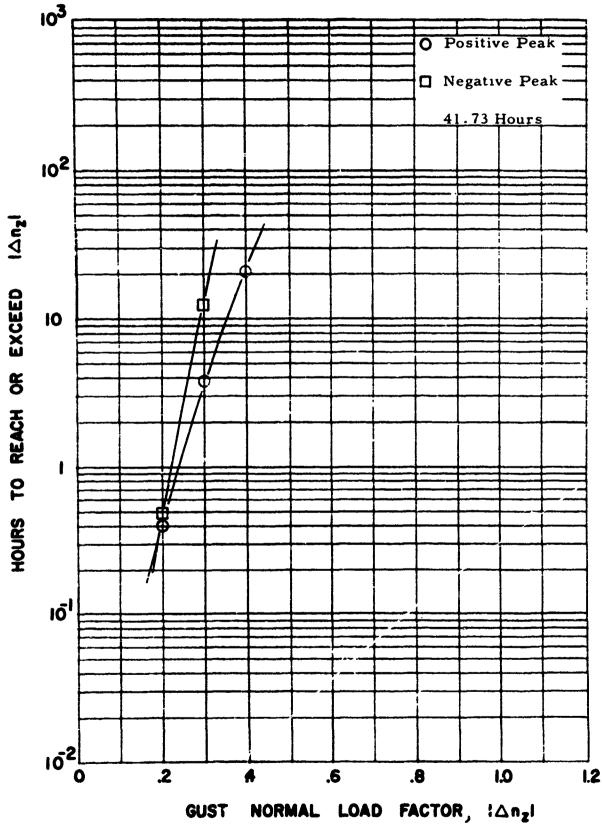


Figure 23. (c) 22,000 to 24,000 Pounds

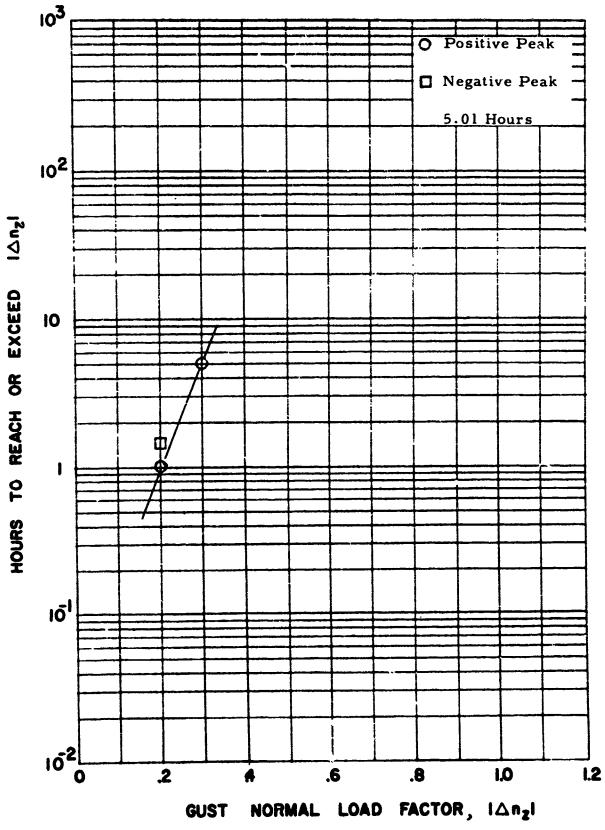


Figure 23. (d) 24,000 to 26,000 Pounds

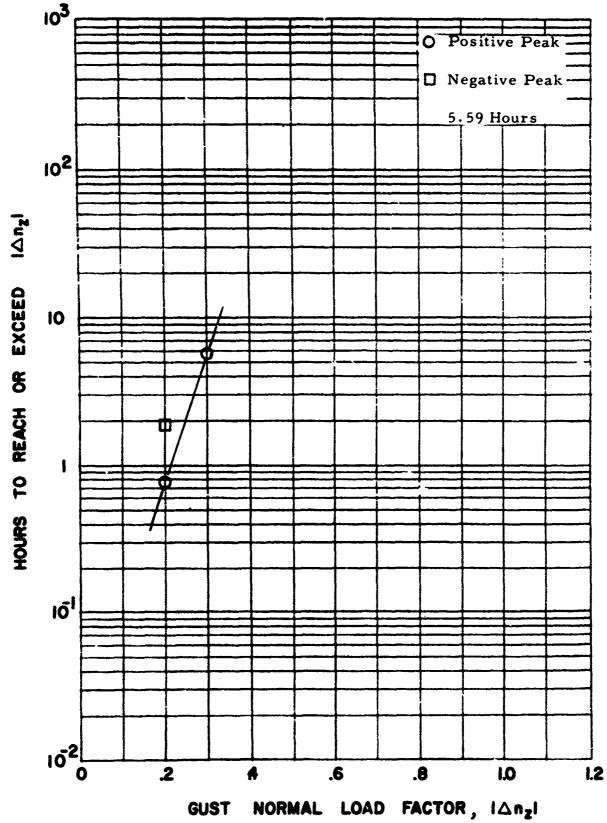


Figure 23. (e) 26,000 to 28,000 Pounds

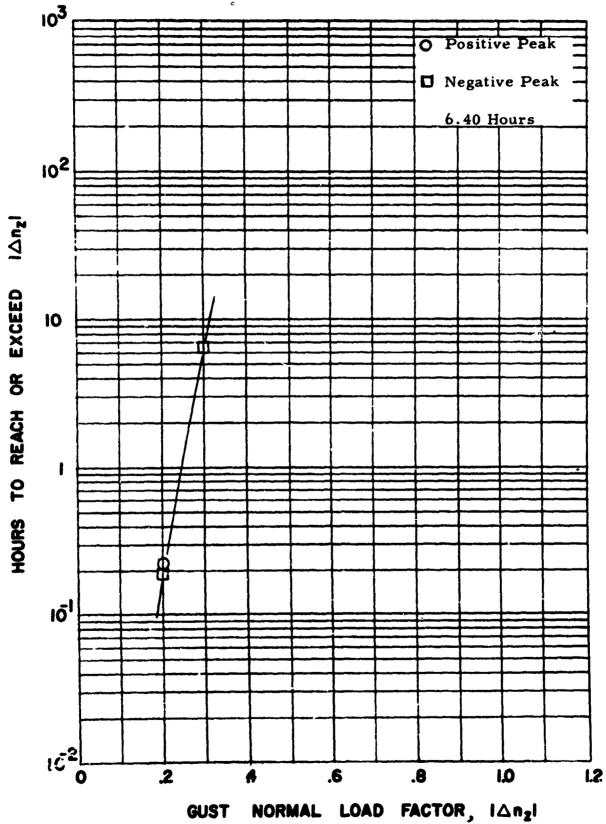
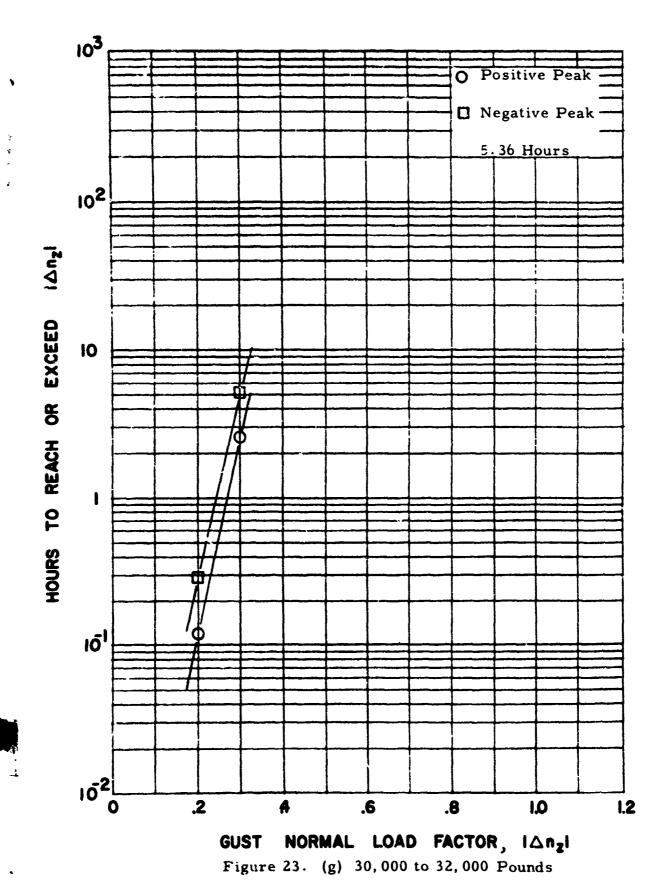


Figure 23. (f) 28,000 to 30,000 Pounds



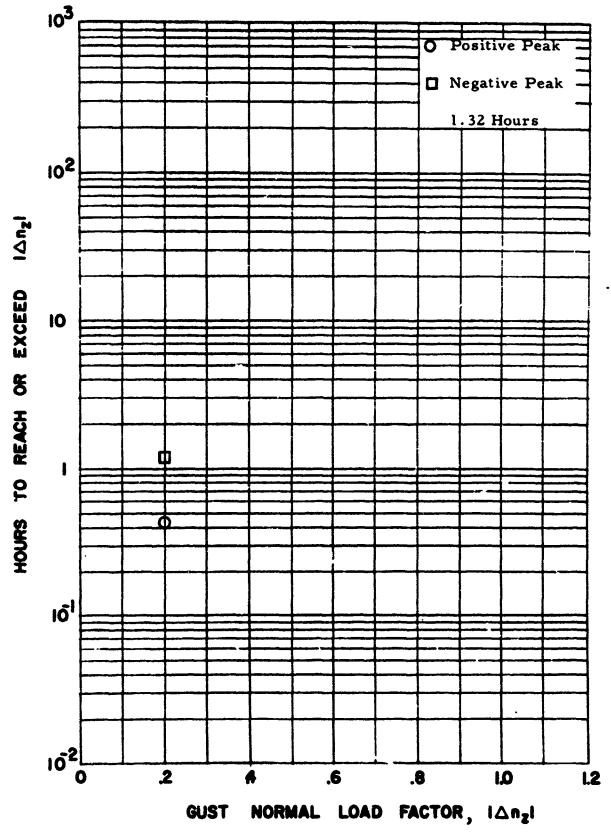


Figure 23. (h) 32,000 to 34,000 Pounds

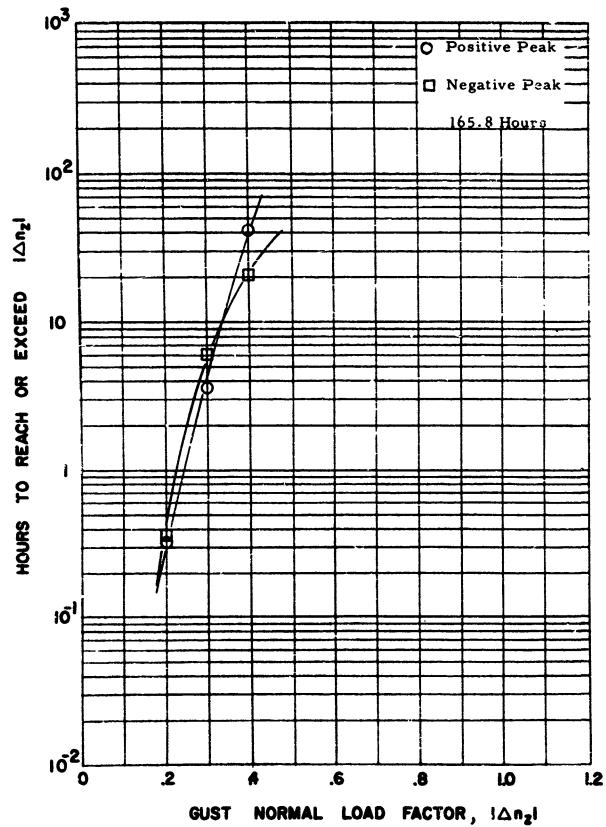
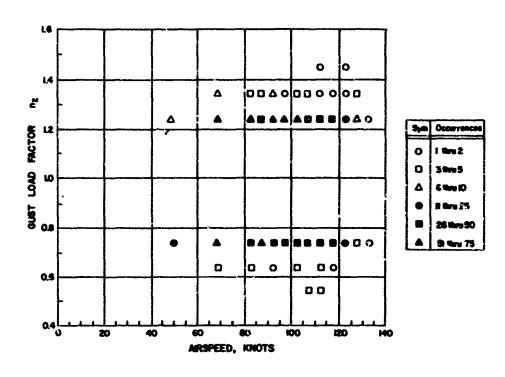


Figure 24. Exceedance Curves for Composite of Incremental Gust Normal Load Factor Peaks



2 3 to

GUST LOAD	AIRBMEED, IGNOTS										TOTAL				
MCTOR a _z	40	828	828	828	858	Sex.	8=8	328	358	868	8.8	B -8	8.8	Beg	Bg
1.5 % 1.6															
1.4 to 1.5									2		2				•
1.3 to 14		9	4	3	7	2	5	5	2	1	2	3			43
1.2 to 1.3	•	72	52	46	56	5 1	53	41	31	29	21	•	1		470
0.8 % 12															
0.7 to 0.8	12	64	34	53	41	49	32	36	44	33	18	5	1		422
0.6 to 0.7		4	3		ı		5		4	2					18
0.5 % 0.6								4	4						•
0.4 to 0.5															
TOTAL	21	149	93	102	105	102	95	86	87	65	43	16	2		9 60

Figure 25. Diagram and Tabulation of Gust Normal Load Factor Peaks in Ranges of Indicated Airspeeds

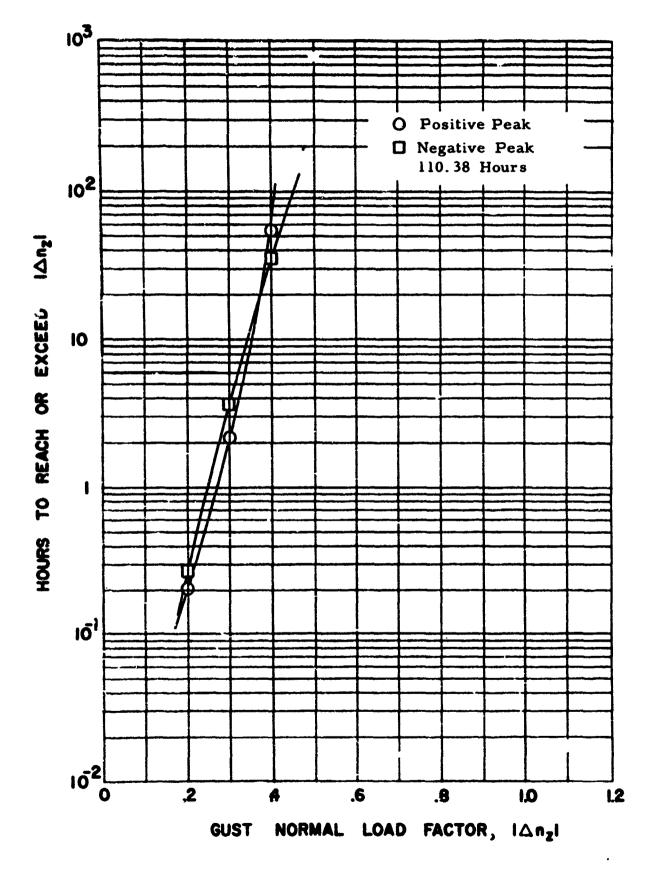


Figure 26. Composite Exceedance Curves for Incremental Gust Normal Load Factor Peaks - CH-54A Helicopter (Reference 3).

APPENDIX II

45 (Saber -

COMPUTER PRINTOUTS

Tables III through XXXIII are computer printouts.

All times are given in minutes unless otherwise specified. Times have been rounded off to the nearest tenth of a minute. Thus, time tables which are added before rounding occurs may disagree with the sum of the rounded values by some fraction of a minute. The method assures that any value shown is within 0.05 minute of the correct value. A time value between 0 and up to but not including 0.05 minute was printed as "0.0", while no time measured was printed as "0.".

Tables having no points or time were not printed.

Table headings are arranged so that the first-mentioned parameter refers to the vertical ranges at the left of the table; the second-mentioned parameter refers to the horizontal ranges at the top of the table; where a third or fourth parameter is mentioned, it is followed by its range in the heading. As an example, the heading 'NZ GUST PEAKS VS VEL. BY MISS. SEC. ASCENT, ALT. LESS, WGT. 30000" indicates the number of gust n_z peaks in selected airspeed ranges for ascent, altitude below 1000 feet, and weight between 30,000 and 32,000 pounds.

The range codes for all parameters are given on the following pages. The codes are the lower limits of each range.

-	l Acceleration t/sec ²)	R	ate of Climb (ft/min)
Code	Range	Code	Range
Less	Below -15	Less	Below -2500
-15	-15 to -12	-2500	-2500 to -2000
-12	-12 to -9	-2000	-2000 to -1500
-9	-9 to -6	-1500	-1500 to -1000
-6	-6 to -3	-1000	-1000 to -500
-3	-3 to 3	-500	-500 to 500
3	3 to 6	500	500 to 1000
6	6 to 9	1000	1000 to 1500
9	9 to 12	1500	1500 to 2000
12	Above 12	2000	2000 to 2500
		2500	Above 2500

		Outside Air					
Tip	Speed Ratio	Temperature (OF)					
Code	Range	Code	Range				
Less	Below 0.00	Less	Below 0				
0.00	0.00 to 0.05	0	0 to 10				
0.05	0.05 to 0.10	10	10 to 20				
0.10	0.10 to 0.15	20	20 to 30				
0.15	0.15 to 0.29	30	30 to 40				
0.20	0.20 to 0.25	40	40 to 50				
0.25	0.25 to 0.30	5 C	50 to 60				
0.30	0.30 to 0.35	60	60 to 70				
0.35	Above 0.35	70	70 to 80				
		80	80 to 90				
		90	Above 90				

Al	titude (feet)	Weight (pounds)					
Code	Range	Code	Range				
Less	Below 1000	Less	Below 20,000				
1000	1000 to 2000	20,000	20,000 to 22,000				
2000	2000 to 5000	22,000	22,000 to 24,000				
5000	5000 to 10,000	24,000	24,000 to 26,000				
10,000	10,000 to 15,000	26,000	26,000 to 28,000				
15,000	15,000 to 20,000	28,000	28,000 to 30,000				
20,000	Above 20,000	30,000	30,000 to 32,000				
		32,000	Above 32,000				

Gust n_z and Maneuver n_z (g)

Airsp	eed (knots)	Maneuver n _z (g)					
Code	Range	Code	Range				
Less	Below 40	Less	Below 0.2				
40	40 to 60	0.2	0.2 to 0.4				
60	60 to 80	0.4	0.4 to 0.5				
80	80 to 85	0.5	0.5 to 0.6				
85	85 to 90	0.6	0.6 to 0.7				
90	90 to 95	0.7	0.7 to 0.8				
95	95 to 100	0.8	0.8 to 1.2				
100	100 to 105	1.2	1.2 to 1.3				
105	105 to 110	1.3	1.3 to 1.4				
110	110 to 115	1.4	1.4 to 1.5				
115	115 to 120	1.5	1.5 to 1.6				
120	120 to 125	1.6	1.6 to 1.7				
125	125 to 130	1.7	1.7 to 1.8				
130	130 to 135	1.8	1.8 to 2.0				
135	135 to 140	2.0	2.0 to 2.2				
146	Above 140	2.2	2.2 to 2.4				
		2.4	Above 2.4				

Collect	ive &	Cyclic
Stick	Peaks	(%)

Stick Peaks (70)									
Code	Range								
Less	Below -40								
-40	-40 to -30								
-30	-30 to -20								
-20	-20 to -10								
-10	-10 to 10								
10	10 to 20								
20	20 to 30								
30	30 to 40								
40	Above 40								

Collective & Cyclic Stick Steady (%)

	
Code	Range
Less	Below 10
10	10 to 20
20	20 to 30
30	30 to 40
40	40 to 50
50	50 to 60
60	60 to 70
70	70 to 80
80	80 to 90
90	Above 90

Thrust Coefficient

	Ratio	Rotor RPM					
Code	Range	Code	Range				
Less	Below 0.06	Less	Below 210				
0.06	0.06 to 0.09	210	210 to 220				
0.09	0.09 to 0.12	220	220 to 230				
0.12	0.12 to 0.15	230	230 to 240				
0.15	Above 0.15	240	240 to 250				
		250	Above 250				

TABLE III FLIGHT TIME FOR MISSION SEGMENT VERSUS WEIGHT

	Libeini.	SUIEST 1	OR 415	SION SE	GPENT Y	1 (TOTAL		
	LESS	20000	22000	24000	2603C	2600	30000	32000	TETAL
ASCENT	41.1	641.0	366.5	22.2	30.7	25.0	16.1	5.1	1173.7
MANUVE	1C.C	217.1	297.3		22.0	20.4	49.2	4.5	644.6
DESCHI	138.0	1031.5	349.9	32.4	45.2	46.1	23.4	4.1	1472.6
STEADY	473.8	3576.3	1400.2	246.4	237.3	288.5	213.0	59.7	6457.2
TOTAL	. 412.9	5409.7	2503.9	301.0	335.2	384.0	321.7	79.5	9948.1

TABLE IV STEADY-STATE TIME FOR ALTITUDE VERSUS AIRSPEED BY WEIGHT AND TOTAL

1	1061#14	uteS1 f	ue ALII	TUEE VS	VELOCE	17 87 W	E IGHT	LESS								
·	LESS	40	40	a U	85	90	95	100	105	110	115	120	125	130	135	140 TOTAL
LESS	43.7	5.7	32.2	10.4	19.6	17.0	12.6	5.4	2.4	1.3	1.7	1.5	0.6	130	137	153.3
1000	14.2	3.5	21.8	22.3	20.2	13.4	12.4	19.1	1.4	14.2	2.3	3.6	3.8			143.5
2600	2.4	3.7	7.8	7.6	8.0	12.7	21.8	14.1	7.5	2.5	1.0	12.6	4.7	0.4		107.1
5(00	4.4		***	7.6	•••		21.0	17.1	7. 3	2.7	1.0		•••	0.4		10
19600																
15000																
20000																
TOTAL	60.3	4.2	61.8	40.3	44.8	43.1	43.0	29.7	20.3	18.0	5.1	17.7	11.1	0.4		403.0
10,50	••••			****		420.	42.0	.,,,			,,,	••••	••••	•••		1020
1	IPE(NI Y	ules) f	OR ALTI	TUCE YS	VELOCI	TY 87 W	EIGHT 2	:00C0								
	LESS	49	60	•0	85	90	95	100	105	110	115	120	125	130	135	140 TOTAL
LESS	271.4	31.8	319.5	213.7	245.5	170.6	114.9	75.4	59.3	41.5	\$4.1	22.2	4.2	3.8		1452.9
1000	159.8	19.0	227.3	140.1	184.4	145.6	121.4	95.1	72.7	35.9	23.0	11.5	17.5	1.0		1254.9
2000	3.4	6.0	76.6	50.5	66.7	44.8	75.1	94.4	87.7	30.8	25.8	19.0	10.5	1.0		412.6
5000																
10000																
15000																
20000																
TOTAL	454.4	50.6	623.4	404.4	494.8	361.0	311.4	264.9	219.7	124.3	82.9	52.7	37.2	6.5		3520.3
LESS	LESS 140.7	40 21.2	60 109.6	80 61.4	85 73.4	90 74.1	95 54.1	100	105 48-0	110 28.7	115 12.0	120	125	130	135	140 TOTAL 730.7
1 300	70.3	7.5	14.5	30.4	33.0	50.2	45.9	29.4	27.6	47.4	35.7	16.6	12.6	1.9		528.7
SC00	1.7		34.2	22.1	28.1	23.7	26.3	20.6	21.9	17.0	7.9	7.4	13.0	2.8		220.7
SCCO																
10000																
15000 20CC0																
TOTAL	240.7	30.7	334 3	114.2	126 2	164 0	148 2	95.7	97.4	93.4	54.5	32.2	28.0	5.5		4400 0
		***	,,,,,	*****		.,	.40.7	13.7	71.6	****	70.7	26.2	20.0	3.3		1486.2
1		utfs; f	OR ALTI	TUCE VS	VELOCI	17 BY .	EIGHT 2	14000								
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	1 36	135	140 TOTAL
LESS	0.7					1.6	4.1	3.3	4.7	1.5	1.5	1.6	1.4	0.3		22.9
1000	5.2	1.6	19.6	4.9	10.7	16.3	10.3	10.2	14.1	25.3	10.3	5.7	2.5			145.0
5000		1.6	9.9	3.2	3.9	1.6	7.1	6.3	9.3	4.7	12.7	4.7	1.5			78.4
5000																
1000																
15000																
20000	4 -		20 4	•	14.4	20 4	38 4	10.0		33 4	34 5	14.				344 -
TOTAL	5.9	3.3	29.4	8.0	14.6	29.6	24.4	19.8	28.1	33.6	24.5	14.3	5.4	0.3		244.4

T.	Δ	K	Ŧ	F.	17	7	_	_	Λτ	١t	Ä	
	a		_	منده		,	-		u	10	ч	_

TI	re (MI AN	TES) FO	R ALTIT	uce vs	VELOCIT	Y 8 Y WE	I'NT Zo	000									
LESS 1C00 2000 3C00 10000 15C00	1.6 0.5	40 0.5	40 13.4 4.9 0.8	80 12.4 5.0 0.4	85 13.4 6.9 1.0	90 24.0 7.2 3.7	95 22.1 7.4 4.5	10') 12.4 8.2 7.0	105 8.2 4.3 20.7	110 4.4 3.5 19.4	115	120 3.6	125	130	135	140	107AL 117.6 50.7 66.7
20000 TOTAL	2.1	2.5	19.0	18.6	21.3	34.9	34.2	28.1	35.3	27.3	11.1	3.4	1.1				237.3
t	IPE(MIN	utfs; f	OR ALTI	TUDE 15	AEFOCI	TY 8Y .	EIGHT 2	0000									
LESS 1000 2000 5000 19000 15000 20000	1ESS 7.2 5.8 0.5	40 1.6 1.1 4.8	40 18.4 18.7 11.8	10.4 20.5 3.2	45 4.7 24.5 3.8	90 4.9 34.3 C.3	95 5.4 46.2 0.4	100 6.2 21.6 1.7	105 1.5 4.6 2.7	110 1-8 2-4 G-8	115 5.2 1.0 0.2	120 4.3 0,3	125	130	135	140	75.2 183.6 30.3
TOTAL	13.5	7.4	48.9	34.2	37.1	39.5	52.0	29.5	•••	5-0	•••	4.5	1.2	0-2			204.5
1	ipe(min	utes) f	00 aL71	luce vs	veloc:	TV BY N	EIGNT 3	0000									
LESS	LESS 21.7	40	40 5.3	2.3	85 0.4	90 1-1	45 0.9	100	105	110	115	120	125	130	135	140	101AL 32.3
1009 2000 5000 19000 19000 20000	0.9	3.4	20.1	10.5	30.2 1.6	31.7 2.4	31.8	14.4	1.9	2.8 9.4	1.6 G.4	2.5	2.3	0.3			145.7
TOTAL	22.4	0.4	75.4	21.9	32.1	35.3	37.7	16.7	10.2	3.5	2.0	2.7	2.3	0.3			213
1	IPE (Alm	utes) f	OR ALTII	lu o e vs	veloc1	TY 87 W	16MT 32	1000									
LESS 1000 2000 5000 10000	S-0	40	40 1.4 0.5	80 1.7 9.5	85 1-1	90 1.8 5.2	95 3.8 1.8	100 11.5 5.9	105	110	115 4.9 1.8	120 9.4 9.2	125	130	135	146	107AL 44.8 14.9
20000 TOTAL	2.0		2.2	2.2	1.1	1.2	5.6	17.4	13.5	3.9	4.7	0.9					59.7
,	FIPE(AL	wtes) (FOR ALTI	ituce vs	AEFOCI	TV #1 W	EIGHT T	OTAL									
LESS 1000 2000 10000	LESS 957.1 254.4 7.9			243.3	312.7	90 294.3 306.9 117.3	299.4	195.2	105 135.5 144.3 153.9	110 104.3 133.7 77.9	115 62.1 75.7 57.3	120 42.4 40.4 45.8	125 16.0 30.0 31.0	130 5.2 3.9 4.1	135	140	7074L 2632.0 2486.4 1136.8
15500 2000 707AL	8 21.7	135.1	1044.5	644.0	705.1	720.5	ee1.7	501.8	433.7	316.0	195.1	120.6	84.4	13-5			6457.3

TABLE V
STEADY-STATE TIME FOR COLLECTIVE STICK POSITION VERSUS
CYCLIC STICK POSITION BY RATE OF CLIMB AND TOTAL

TI	PE (HINUI	IFS) FU	R COLL	ECTIVE	VS CYCL	IC EY C	LIMB -1	500			
1 ESS	LESS	10	20	30	4C	50	60	70	80	90	TOTAL
10											
20						0.3					0.3
30						0.3					0.3
40				0?	0.1	1.0					1.3
50				V •.	V-1	0.1					c. i
60											•••
70											
80											
90											
OTAL				0.2	0.1	1.7					2.0
TI	PE (MI NU 1	TES) FO	R COLL	ECTIVL	VS CYCL	IC BY CI	LIMB -1	000			
	LESS	10	20	30	4C	50	60	70	80	90	TOTAL
LFSS											
10						0.3					0.3
20					1.9	8.3	0.8				11.0
30				0.5	4.5	9.1					14.1
40				2.1	4.4	8.6					15.2
50			0.1	0.2	0.3	2.6					3.2
60						0.1					0.1
70											
87											
90											
OTAL			0.1	2. s	11.2	29.0	8.0				43.9
1.1	IPEIM. 4L	TES) FU	e COLL	ECTIVE	VS CYC	.1C HY C	LIMB -	-500			
1 5 5 5	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS						^ =					
10					0.1	0.5	C.3				0.9
50				22.4	25.5	96.0	40.6	7.8			170.0
30			1.9	22.6	344.8	787.6	126.0	13.4			1296.4
40			2.3			1536.3	149.0	0.6			3010.5
50			3.6	118.8		1043.6	86.3				1797.3
60				3.3	5,5	31.4					40.3
70											
80											
90 OTAL			7.8	361.4	2026.6	3495.3	402.2	21.9			6315.2
T	I PE (MI NU	ITES) F	JR COLI	LECTIVE	VS CYC	LIC BY C	LIMB	500			
	LESS	10	20	30	40	50	60	70	80	90	TUTAL
LESS											
10						_					
20					0.3		6.1				0.6
30					1.7		C.1				15.6
40				1.4			1.2				51.7
50				3.9		12.8	0.2				23.0
				0.4	0.7	1.1					2.3
60											
60 70											
60 70 80											
60 70				5.7	34.9	51.7	1.6				94.0

m	77 7	-	7.7		4.1
TΑ	ВL	ظر	V	~	contd.

	IIME(MINU	ILS) FUR	COLL	ECTIVE	VS CYCL	IC BY C	LIMB	1000			
	LESS	10	20	3∪	40	50	60	70	80	90	TUTAL
LESS											
10											
20 30											
40					1.C	1.1					2.1
50					0.1						C.1
60											
70											
80 90											
TOTAL					1.1	1.1					2.2
	TIPE(MINU	(FS) FO	COLL	ECTIVE	VS CYC	TIC BA C	L IMB	TCTAL			
	LESS	FES) FOI	S CULL	ECTIVE 30	VS CYC	LIC BY C	P IMB	TCTAL 70	80	90	TOTAL
LESS	LESS				4C	50	60		80	90	
LESS 10	LESS				4G 0.1	50 C.8	60 0.3	70	80	90	1.2
LESS 10 20	LESS		20	30	46 0.1 27.7	50 C.8 104.8	60 0.3 41.5	70 7. 8	80	90	1.2
LESS 10 20 30	LESS				0.1 27.7 351.0	50 C.8 104.8 810.8	60 0.3 41.5 126.0	70	80	90	1.2
LESS 10 20	LESS		20	30 23.1	0.1 27.7 351.0 1136.5	50 C.8 104.8	60 0.3 41.5	70 7.8 13.4	80	90	1.2 181.8 1326.4 3080.8 1824.5
LESS 10 20 30 40 50	LESS		20 1.9 2.3	30 23.1 220.4	0.1 27.7 351.0 1136.5	50 C.8 104.8 810.8 1570.7	60 0.3 41.5 126.0 150.2	70 7.8 13.4	80	90	1.2 181.8 1326.4 3080.8
LESS 10 20 30 40 50 60	LESS		20 1.9 2.3	23.1 220.4 122.9	0.1 27.7 351.0 1136.5 552.4	50 C.8 104.8 810.8 1570.7 1059.1	60 0.3 41.5 126.0 150.2	70 7.8 13.4	80	90	1.2 181.8 1326.4 3080.8 1824.5
LESS 10 20 30 40 50 60 70	LESS		20 1.9 2.3	23.1 220.4 122.9	0.1 27.7 351.0 1136.5 552.4	50 C.8 104.8 810.8 1570.7 1059.1	60 0.3 41.5 126.0 150.2	70 7.8 13.4	80	90	1.2 181.8 1326.4 3080.8 1824.5
LESS 10 20 30 40 50 60	LESS		20 1.9 2.3	23.1 220.4 122.9 3.8	0.1 27.7 351.0 1136.5 552.4	50 C.8 104.8 810.8 1570.7 1059.1 32.7	60 0.3 41.5 126.0 150.2	70 7.8 13.4	80	90	1.2 181.8 1326.4 3080.8 1824.5

TABLE VI STEADY-STATE TIME FOR ROTOR RPM VERSUS RATE OF CLIMB BY OUTSIDE AIR TEMPERATURE AND TOTAL

71	PE [M] Y	UTES) F	OR RPM	VS CLI	PB BY T	EMPERATU	RE	10				
	LESS	-2500	-2000	-15CO	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS												
210												
220						4.7						4.7
230						7.7						4.0
240												
250 TOTAL						4.7						4.7
IUIAL						. • •						

T	IPE (MIA	IUTES) F	OR RPM	A2 CFI	MB BY T	EMPERAT	URE	20				
LESS	LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210 220 230 240					0.8		· c.e					13.6 206.6
250 TOTAL					0.8	218.9	0.8					229.4

i	TIPECHLY	UTES) F	OR RPM	VS CLI	MR BY 1	EMPERAT	URE	30				
	LESS	35.00	2000				***					
LESS	FE 22	-2500	-2000	-15CO	-1000	-500	500	1000	1500	2000	2500	TOTAL
210												
220					0.2	27.1	0.1					27.4
230				0.3	6.5	573.7	12.6	0.1				593.1
240 250						4.2						4.2
YOTAL				0.3	6.7	404.9	12.7	0.1				624.7
						• • • • • • • • • • • • • • • • • • • •						
	TIPECMIN	HITES) E	-	VS CLI	MR SV 1	TEMPERAT	URF	40				
			U N 11717	7, 00.		CIII CHAI	U					
		-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS 210												
220						20.3						20.3
230				0.5	2.9	543.3	5.7	0.3				552.7
240						1.9	• -					1.9
250												
TOTAL				0.5	2.9	565.5	5.7	0.3				574.8
	TIPE(MI	IUTES) F	OR RPM	VS CL	NB BY	TEMPERAT	URE	50				
	1 5 5 5	-2500	-2000	-15C0	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS		-2700	-1000	-1700	-1000	- 700	300	1000	1700	2000	£ 700	10176
210)					2.3						2.3
220						26.1	1.4	_				87.5
230				0.1		1349.1	20.2	0.7				1383.9
240 250					0.3	13.1	0.6					14.0
TOTAL				0.1	14.2	1450.6	22.2	0.7				1487.7
	TIPEIMIN	NTEST F	OR RPH	VS CLI	MB BY	EMPERAT	URE	60				
	1 5 5 5	-2500	-2600	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS		-2 700	-2000	-1300	~1000	- 200	700	1000	1700	2000	2 700	IUIAL
210						14.2						14.2
220					0.5	190.5	0.4					191.4
230				1.1	10.4	1446.3	22.0	0.9				1480.7
240 250						14.4	0.2					16.6
TOTAL				1.1	10.9	1667.4	22.6	0.9				1702.9
•	TIPEIMIN	UTFS) F	OR RPM	A2 CFI	MB BY	TEMPERAT	URE	70				
	LESS	-2500	-2000	-15CO	-1020	-500	500	1000	1500	2000	2500	TOTAL
LESS		2,700		.,.,	.070	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	J 00		- 200	1900	2 700	10176
210					0.8	47.7	0.1					48.5
220						167.7	4.0					172.1
230					5.Q	1131.4	13.9					1150.3
240 250						3.3	0-1					3.4
TOTAL					6.2	1350.1	18.1					1374.4
	TIPE(MI	WIEST F	UT RPP	A2 CF	MR 87	EMPERAT	URE	80				
		-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS												
210						2.3	4 4					2.3
220 230					0.l 2.3	91.9 354.5	4.2 7.7	0.3				96.5 364.5
240							***					24403
250												
TOTAL					2.4	448.8	11.9	0.3				463.3

₹1	IPECMIN	utes) F	OR RPH	A2 CT1	NS BY	TEMPERAT	URE	90				
	LESS	-2500	-2000	-15C0	-1000	-500	500	1000	1500	2000	2500	TOTAL
LESS												
210												
220						1.2						1.
230						3.2						3.
240												
250												_
DTAL T	I PE (MIN	IUTES) F	OR RFM	VS CŁI	MB AY I	4.3 Temperati	URE TI	DTAL				♣•}
T	I PE (MI N		OR RPH -2000		MB BY 1		ure to	1000	1500	2000	2500	4.:
T LESS					-1000	TEMPERAT	500		1500	2000	2500	TOTA
T LESS 210					-1000 0-8	-500	500 0.1	1000	1500	2000	2500	TOTAL
T: LESS 210 220				-1500	-1000 0.8 1.2	-500 -66.5 598.6	500 0.1 10.1	1000	1500	2000		TOTA 67.4
ESS 210 220 230					-1000 0.8 1.2 41.6	TEMPERATO -500 66.5 598.6 5611.3	500 0.1 10.1 82.9	1000	1500	2000		TOTA
ESS 210 220				-1500	-1000 0.8 1.2	-500 -66.5 598.6	500 0.1 10.1	1000	1500	2000		TOTA 67. 610. 5739.

TABLE VII STEADY-STATE TIME FOR C_T/σ VERSUS μ BY RATE OF CLIMB AND TOTAL

•	• • • • • • • • • • • • • • • • • • • •		OR CT/S		US MU	BY CL		500		
	LESS	0.00	0.05	0.10	0.15	C.20	0.25	9.30	0.35	TOTAL
LESS										
0.06										
0.09				0.3	9.0	1.0	0.1			ā.0
0.12										
0.15										• •
OTAL				0.3	0.6	1.0	C.1			2.0
1	IFELMIN	utES) Fi	JR CT/5	S VERS	US MU	BY CI	LIMB -	loco		
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.06				0.2	0.2					0.5
0.09		0.4	1.2	3.1	18.2	13.5	3.1			39.5
0.12					0.8	1.9	0.1			2.9
0.15					0.1	0.9	C.1			1.1
OTAL		0.4	1.2	3.3	19.4	16.3	3.4			43.9
1	TPE (MIN	utes! f	OR CT/	S VERS	ius Mu	BY C	L IMB	-500		
•		•							0.36	T0741
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS		20 5	١. ٥	Λ 6	0.3		2 4			27 4
0.06	2.9	20.5	1.9	0.5	0.2	8.0	3.6	17.0		37.0
0.09	105.1	561.1	83.0			2171.2	691.7	17.9		5184.
0.12	2.6	35.8	7.6	28.7	174.6	466.9	211.4	1.9		929.
0.15	0.1	4.4	0.3	0.9	30.5	98.4	38.8	0.3		163.
TOTAL	110.8	621,9	62.9	188.2	1601.3	2734.6	945.5	20.0		6315.

1	TIPECMIN	UIES) F	UR CT/	S VER	SUS MU	ву (CLIMB	500		
	LFSS	0.CO	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.06					0.6					0.6
0.09		1.2	1.1	3. 3						76.0
0.12		0.2		0.2		1.8				5.3
0.15			0.1	0.3	9.2	1.3	0.3			2.1
TOTAL		1.4	1.2	3.7	57.8	23.9	6.1			94.0
1	IFECHIN	utfs) fo	J9 CT/5	VEHS	SUS MU	84 C	LIMB	1000		
	LESS	0.CO	0.05	0.10	0.15	C.20	0.25	0.30	0.35	TOTAL
LESS										
0.06										
0.C9					1.3	C.4	G-1			1.8
0.12					0.4					0.4
0.15										
TATO					1.7	0.4	C.1			2.2
1	TIPE(MIN	UTES) F	DR CT/	S VER	SUS ML	BY (LIMB T	UTAL		
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	C.30	0.35	TOTAL
LESS										
0.06	2.9	20.5	1.9	0.7	1.0	8.0	3.6			38.7
0.09	105.1	562.7	85.3	164.8	1470.9	2207.0	699.9	17.9		5313.6
0.12	7.6	36.0	7.6	28.9	178.1	470.5	212.5	1.9		938.2
0.15	0.1	4.4	0.4	1.2	30.7	90.6	39.2	0.3		166.9
TOTAL	110.8	623.6	95.2	195.6	1680.7	2774 1	955.2	20.0		6457.3

TABLE VIII
CYCLIC STICK PEAKS VERSUS CYCLIC STICK
STEADY BY COLLECTIVE STICK STEADY

CLIC PE	AKS 78	CYCI.	IC STEA	DY RY C	CLL. ST	EADY	20			
LESS	10	20	30	40	50	60	70	80	90	TOTAL
				_	_					_
				1 2	7	2				5 11
				_		_				
				_	• •					
				3	11	2				16
0.	0.	0.	0.	27.7	104.8	41 5	7.8	0.	0.	181.8
''	LESS	LESS 10	LESS 10 20	LESS 10 20 30	LESS 10 20 30 40	LESS 10 20 30 40 50 1 2 7 3 11	1 4 2 7 2 3 11 2	LESS 10 20 30 40 50 60 70 1 2 7 2 3 11 2	LESS 10 20 30 40 50 60 70 80 1 2 7 2 3 11 2	LESS 10 20 30 40 50 60 70 80 90 1 4 7 2 3 11 2

TA	RI	E.	VIII	- 60	ntd

CY	CLIC PE	AKS VS	CYCL	IC STEAI	DY BY C	OLL. ST	EADY	30			
	LFSS	10	20	30	40	50	60	70	80	90	TOTAL
LESS	FL 22	10	20	30	70	70	00		00	70	10172
-40 -30						•					2
-50					3	2 4					7
-10				4	10	24	11				49
10 20					4	11	. 2				17 3
30					•						
40 TGTAL				4	20	41	13				78
	_								_	_	
TIPE	0.	u.	1.9	23.1	351.0	81C.8	126.0	13.4	0.	0.	1326-4
C,	YCLIC PE	EAKS VS	CYCL	IC STEA	DY BY (COLL. ST	EADY	40			
			20	30	4.0	50	40	70	80	90	TOTAL
LESS	LESS	10	20	30	40	20	60	70	80	70	IUIAL
-40					•			•			4
-30 -20				1	2 5	1 11	2	1			4 19
-10				7	48	57	2				114
10 20				3	9	11	1				23 1
30											
04 Tatet				11	64	80	5	1			161
									_	•	
TIME	0.	0.	2.3	220.4	1136.5	1570.7	150.2	0.6	0.	0.	3080.8
C,	YCLIC PI	AKS VS	CYCL	IC STEA	DY BY C	COLL. ST	EADY	50			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40											
-30											
-20 -10				1	3	8 44					12 89
10				1 2	44	4					13
20											
30 40											
TOTAL				4	54	56					114
TIPE	0.	0.	3.7	122.9	552.4	1059.1	86.5	0.	0.	0.	1824.5

TABLE	VIII -	contd.
-------	--------	--------

C.	YCLIC PE	AKS VS	CYCL I	C STEAD	Y BY C	OLL. STE	ADY	60			
LESS -40 -30 -20	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-10 10 20 30						1					1
TOTAL						1					1
TIME	0.	0.	0.	3.8	6.2	32.7	c.	0.	0.	0.	42.7

TABLE IX
CYCLIC STICK PEAKS VERSUS CYCLIC STICK
STEADY BY DENSITY ALTITUDE

	CACFIC b	EAKS VS	CYCL	IC STEAM	DA RA	/ ALT	I TUDE	LESS			
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-4(-3(_				2	2		•			
-20				1	8	15	2	1			6 26
-10				9	44	56.					116
10 20				4	15 3	18	2 1				39 4
3(4()				_						
TOTAL	L			14	72	92	12	1			191
TIPE	0.	0.	5.1	290.5	797.1	1592.7	136.2	10.3	0.	٥.	2831.9

	CACFIC	PEAKS VS	CYCL	IC STEAD	Y 81	r ALT	ITUDE	1000			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LES											
-4											
~3											
-2				1	4	12					17
-10				3	55	12 69 9	8				135
10	D			ı	4	9					14
20	0										
3											
4(-										
TOTAL	L			5	63	90	8				166
TIPE	0.	0 •	2.8	48.6	776.0	1447.7	203.3	8.2	0.	0.	2486.6

T.	Δ1	R	T.T	•	73	7	_	^	~ **	+	a	
_ 1 4	₼.	9	LJE	٠.	Ŀſ	•	-	C	UΠ	u	u.	

	CYCLIC PE	EAKS V	S CYCL	IC STEA	/DY - 87	/ AL1	I TUDE	2000			
LESS -40 -30	•	10	20	30	40	50	60	70	80	90	TOTAL
-20 -10 10 20 30	: 				5 1	7					12
40 TOTAL	•				6	7					13
TIME	0.	u.	0.	31.0	500.8	538.5	65.0	3.4	0.	0.	1138.8

TABLE X
CYCLIC STICK PEAKS VERSUS CYCLIC STICK
STEADY BY AIRSPEED

				S	TEAD	Y BY	AIRSI	PEED				
	CACFIC	PEAKS	٧s	CYCL 10	STEAD	Y 8Y	VELO	CITY	LESS			
	LES!	5	10	20	30	40	50	60	70	80	90	TOTAL
LESS												
-40 -30						2	3		i			6
-20					1	8	9	1	•			19
-10					ż	31	47	13				98
10					2	13	13	2				30
20						2		1				3
30												
40					10	56	72	17	1			156
TOTAL	•				10	70	12	11				176
TIPE	0.	U	•	2.1	.37.6	276.8	321.3	165.4	18.5	0.	0.	821.7
	CYCLIC	PE AK S	. VS	CYCLI	C STEAD	Y BY	VEL(OCITY	40			
	LES	S	10	20	30	4C	50	60	70	80	90	TOTAL
LES												
-4												
-3	-				_		_	_				_
-2					1		3	1				
-1						4	,					11
						•	•					-
4												
TOTA	L				1	6	11	1				19
TIME	0.	C).	0.	11.7	56.5	36.1	0.9	0.	0.	0.	105.1
1: 2: 3: 4: TOTA	0 0 0 0 L	o) .	0.	-	6	11 11 36.1	1		0.	e.	10

T	A	B	T	E.	X	_	contd	
		_	_		41	_	COMPA	-

c	YCLIC P	EAKS VS	CYCL	IC STFA	NDY AY	VELO	CITY	60			
LESS -40	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-30 -20 -10				2	3 24	8 23	1				11
10 20 30				i	2	5	•				50 8 1
40 TOTAL				3	3C	36	1				70
TIPE	0.	0.	5.1	94.6	420.8	498.5	25.5	0.	0-	0.	1044.5
c	YCLIC PE	AKS VS	CYCLI	C STEAL)Y 8Y	VELOC	ITY .	80			
LESS -40 -30	LESS	10	20	30	4C	50	60	70	80	90	TOTAL
-20 -10 10 20				1	1 12 1	2 17 1	1				3 31 2
40 TOTAL		•		1	14	20	1				36
TIME	0.	0.	0.3	55.1	195.0	375.7	17.9	0.	0.	0.	644.0
C	vritr be	AKS VS	cvci 1	C STEA	DY BY	V ELO(. 170	85			
·	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40 -30									-		_
-20 -10 10 20 30				2	13	10 1					2 25 3
40 TOTAL				3	14	13					30
TIME	0.	0.	0.	51.4	224.3	482.5	26.5	0.4	0.	0.	785.'.

TABLE X - contd.

	CYCLIC P	EAKS VS	CYCL	IC STEA	DY 8Y	VELO	YTIO	90			
LES		10	20	30	40	50	60	70	80	90	TOTAL
-3: -2: -1: 1: 2: 3: 4: TOTA	0 0 0 0 0 0 0			1	10	1 13 1					1 23 2
TIME	0.	0.	0.3	51.1	228.1	405.0	34.5	1.5	0.	0.	720.5
****									•		
	CYCLIC P			IC STEA			CITY	95	•		
LES: -4(-3(0 0	10	20	30	40	50	60	70	80	90	TOTAL
-1(2) 3)	0 0 0 0				7	9					16 5
TOTA					8	13					21
TIPE	0.	0.	0.	38.5	212.2	374.2	36.1	0.7	0.	0.	661.7
	CYCLIC P	EAKS VS	CYCLI	C STEAL	DY BY	VELO	CITY	100			
LES -4 -3	0 0	10	20	30	40	50	60	70	80	90	TOTAL
-2: -1: 1 2: 3:	0 0 0 0				3	5 1					8
TOTA					3	6					9
TIME	0.	0.	0.	19.1	179.3	286.1	16.6	0.6	0.	0.	501.8

С	YCLIC PE	AKS VS	CYCLIC	STEAD	Y BY	VELCO	CITY	110			
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40 -30											
-20 -10						1					1
10											
20 30											
40 TOTAL						1					1
TIME	0.	0.	0.	1.9	75.5	194.9	43.7	0.	0.	0.	316.0
1146	U.	U•	u.	1.9	(3.3	174.7	4347	0.	0.	U.	310.0
c	YCLIC PE	AKS VS	CYCLIC	STEAD	Y dy	VELOC	CITY	115			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40	CCJJ		20	30	70	70			00	,,	
-30											
-20 -10						1					1
10											
20 30											
40 TOTAL						1					1
TIME	0.	0	0	^	30.4		17.3	•	•	^	
line	u.	0.	0.	0.	39.4	138.4	17.3	e.	0.	0.	195.1
c	YCLIC PE			STEAD		VELGO		120			
LESS -40 -30	LFSS	10	20	30	40	50	60	70	80	90	TOTAL
-20 -10						1					1
10						•					
20 30											
40 TOTAL						1					1
	•	0	^	•	10 /			•	•	_	
TIPE	0.	0.	0.	0.	10.0	109.3	C.7	0.	0.	С.	128.6

TABLE XI CYCLIC STICK PEAKS VERSUS CYCLIC STICK STEADY BY ROTOR RPM AND TOTAL

	CYC'IC PE	AKS VS	CYCLI	IC STEAD	Y EY	R	PY	220			
LES!	Ď	10	20	30	40	50	60	70	80	. 90	TOTAL
-30 -20 -10	0 0			1 6 1	1 25 7	4 11 4	3				6 45 12
20 30 40	0				1		1				2
TOTAL				8	34	19	4				65
TIME	0.	0.	3.8	47.9	398.7	121.4	36.0	2.4	0.	0.	610.1
	CYCLIC PE	AKS VS	CYCL	IC STEAD	Y BY	R	PP	230			
LES:	0	10	20	30	40	50	60	70	80	90	TOTAL
-3(-2(Ď			1	2 11	3 22	2	1			6 36
-1(1(2(3(4(0 0 0		τ	6 4	77 13 2	121 23	12				216 42 2
TOTAL				11	105	169	16	1			302
TIPE	0.	0.	4.1	320.0 1	.664.2	3428.1	307.9	15.4	0-	0.	5739.7
	CYCLIC PI	EAKS VS	CYCL	IC STEAD)Y 8Y	R	PH	240			
LES -4	0	10	20	30	40	50	60	70	80	90	TOTAL
-3 -2 -1 1 2	0 0 0 0				2	ı					1 2
TOTA					2	1					3
TIME	0.	0.	0.	1.3	10.6	25.5	2.1	0.4	0.	0.	40.0

	CYCLIC PE	AKS VS	CACFI	C STEAD	Y 81	r R	PP 1	TOTAL			
LES:		10	20	30	40	50	60	70	80	90	TOTAL
-3: -2: -1: 1: 2:	0 0 0 0 0			2 12 5	12 104 20 3	3 27 132 27	2 15 2 1	1			6 43 263 54 4
TOTA				19	141	139	20	1			370
TIPE	0.	0.	7.9	370.1 2	073.9	3578.8	404.6	21.9	0.	0.	6457.2

TABLE XII CYCLIC STICK PEAKS VERSUS AIRSPEED ACCELERATION BY MISSION SEGMENT

	1555	-15.0	-12.0	-9-1	-6.0	-3.9	3.0	6.0	9.0	12.0	15.0	TUTAL
LESS			••••		•••	,	,	0.0	4.0	12.0	17.0	
-40												
-30						58	4					32
-20					2	316	55	2				342
-10 10						430	26					456
20						60	,	1				64
30						1						1
40						•						•
TOTAL					2	835	55	3				895
ε,						IOM SEGR		UVR				
	LFSS	-1>.7	-15-0	-9.0	-6.0	-3.0	3.0	6.0	9.0	12.0	15.0	TOTAL
-40												
-30						13						14
-50					ė	110	6					130
-10					i	100	ī					107
10					4	25	ž					31
20												
30												
40 TOTAL						304	_					
IUIAL					17	256	9					202
C,						INN SEGM	IENT DES	CNT				
	ress	-1>.0	-12.0	-9.0	-4.0	-3.0	3.0	4.0	9.0	12.0	15.0	TOTAL
LESS -40						1 22						1
-30						223						223
-20				1	25	1254	2					1282
-10				•	ží	771	i					793
10					`i	98	-					105
20						•						•
20						ı						ī
				1								
40 IOTAL					53	2378	3					2435

TABLE XIII CYCLIC STICK PEAKS VERSUS AIRSPEED BY MISSION SEGMENT

C	VCLIC PH	MKS VS	VELOC	1TY BY	MISSI	ON SFGMI	FMT ASC	ENT									
LESS	LESS	40	60	80	8>	♥ 0	45	100	105	110	115	120	125	1 30	,	140	TOTAL
-40 -30 -20 -10 10	231 201 13	56 68 8	36 116 20	18 4	6 23 11	2 1 11 2	2 7 3	1 7 1	5 5	1							32 342 456 64
30 40	1			•													\$
TOTAL	472	136	176	25	40	16	12	9	•	1							495

C.	ACFIC LE	AKS VS	AET OC	114 BY	MISSI	DA SEGMI	MAY TES	n Aw									
LESS	£7 SS	40	40	.0	85	70	95	100	105	110	115	150	125	1 30	135	140	TOTAL
-40																	
-30 -20 -10 10	11 26 7 1	2	1			_	_	_	_		_						14
-20	26	43	36	8		Ž	Z	3	1	_							130
-10		19	37		11	•	•	2	•	2							107
10	ı	,	10	,	t	~	,		•								31
20 30																	
40																	
TOTAL	47	67	46	21	23	12	12	5	5	2	2						585

C	ACFIC be	AKS VS	AEFOC	114 84	#12210	DN SEGM	EMI CES	CNT									
	LESS	40	60	₩ O	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	1			•													1
-40	19	3															22
-30	195	70	5	3													223
-30 -20	70ú	253	265	27	15	11	7	3			ı						1505
-10	224	165	279	39	30	30		11	4	3							793
10	47		28	4	,	5	ı	4	1								105
20	5		1	2													
30	1																1
40																	
TOTAL	1197	447	570	75	52	46	16	10	5	3	1						2435

TABLE XIV CYCLIC STICK PEAKS VERSUS ROTOR RPM BY MISSION SEGMENT

	CYCLIC	PEAKS	VS I	RPM BY	REIM	ION SEG	PENT A	SCENT
1 60	LESS	210	220	230	240	250	TOTAL	
LES: -4(
-3(6	26			32	,
-20			131	202	٠9		342	
-10)	1	131	320	4		456	
10		3	9	52			64	•
20				_			_	
30				1			1	l
TOTAL		4	277	٠ 401	12		205	•
1017	L	•	211	601	13		895	•
	CYCLIC	PEAKS	VS I	RPM BY	MICC	ION SEG	MENT 1	4ANIIVO
			,		N. 33	IUN JEG	LIENT L	THITUTA
	LESS	210	220	230	240	250	TOTAL	_
LESS								
-4 (•	_				
-30 -20		1	5	9	•		14	
-10			35 12	87 90	7 5		130	
i		2	1	28	,		107 31	
20		_	•				<i>.</i>	
30								
40								
TOTAL	L	3	53	214	12		282	?
	CACFIC	PEAKS	vs f	RPM BY	MISS	ION SEG	MENT C	ESCNT
	LESS	210	220	230	240	250	TOTAL	
LESS				1			1	•
-40			10	12			22)
-30		1	107	113	2		223	}
-20		2	431	835	14		1282	<u>.</u>
-10		5	223	556	8	1	793	
10		1 2 5 7 2	17	90	1		105	
20 30		2	2	4			8	
40				1			1	
TOTAL		17	790	1602	25	1	2435	:
	•	• •	. 70	1002	23	¥	4737	1

TABLE XV COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK STEADY BY CYCLIC STICK STEADY

C	DLLFC11v	E PEAKS	vs co	LL.\$714	NDY BY C	YCLIC ST	TEADY	20			
LESS -40 -30	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-20 -10 10 20 30						1					i
40 TOTAL						1					1
TIME	0.	0.	0.	1.9	2.3	3.7	c.	0.	0.	0.	7.9
c	OLLECT (VI	DEAKS	AS LUI	1: 6754	NY &W C	VCL 15 C 1	'EANV	30			
C									•0	90	TOTAL
LESS -40 -30	LESS	10	20	30	40	50	60	70	80	90	TGTAL
-20 -10 10 20				2	5 7 5	3 4					10 11 5
30 40 TOTAL				2	17	7					26
TIME	0.	0.	0.	23.1	220.4	122.9	3.8	0.	0.	0.	370.1
C	OFFECLIA	E PEAKS	s vs co	LL.STE/	IDY BY C	SYCLIC S	TEACY	40			
	LFSS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40											
-30 -20				1 6	1 17	1 18					3 41
-10 10 20 30			1	1	13	8	1				30 4
40 Total			2	15	32	28	1				78
TIME	0.	0.1	27.7	351.0	1136.5	552.4	6.2	0.	0.	0.	2073.9

TABLE XV - conto	T	AP	tT.1	F. X	'V -	C0	ntd
------------------	---	----	------	------	------	----	-----

+	COLLECTIV	E PEAK	s vs co	LL.STE	ADY BY	CYCLIC S	TEADY	50			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40											,
-30				1	1 2						1 3
-20			5	20	14	5					44
-10			5 2 2	9	20	5 7	1				39
10			2	2	1	1					6
20											
30											
40 TOTAL			9	32	38	13	1				93
TIME	0.	0.8	104.8	810.8	1570.7	1059.1	32.7	0.	0.	0.	3578.9
C	COLLECTIV	E PEAKS	. vs co	LL.STEA	DY BY C	YCLIC SI	TEAUY	60			
LESS -40 -30 -20	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-10 10 20 30 43					1						1
TOTAL					1						1
TIPE	0.	0.3	41.5	126.0	150.2	86.5	c.	0.	0.	0.	404.6

TABLE XVI
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK
STEADY BY DENSITY ALTITUDE

	COLLECTIV	E PEAKS	٧S	COLL.	STEADY 8	Y ALTI	PUDE	LESS			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30				2	3	1					6
-20	1		4	13	31	23					71
-10	}		1	5	`3	9					48
10)		2	2	3 31 '3 3	2					9
20	1										
30											
40											
TOTAL	•		7	22	70	15					134
TIME	0.	1.1	74.8	631.0	1514.0	593.9	17.3	0.	0.	0.	2831.9

TABLE XVI - cont	ΕC	3	l	l	l	l				•		í
------------------	----	---	---	---	---	---	--	--	--	---	--	---

	COLLECTIVE	PEAKS	vs	COLL.	STEADY BY	r ALTI	TUDE	1000			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS -40											
-30)										
-20 -10			1 2 1	14 11	4 8 3	3 10	2				22 33
10			1	1	3	10	~				5
20)		_		_						
30 40											
TOTAL			4	26	15	13	2				60
TIPE	0.	0.1	81.9	589.8	1021.4	772.3	21.1	0.	0.	0.	2486.6
	COLLECTIVE	PEAKS	٧S	COLL. S	STEADY BY	ALTI1	TUDE	2000			
	LESS	PEAKS 10	VS 20	COLL. 9	STEADY BY	/ ALTI1	3QU1	2000 70	80	90	TOTAL
LESS	LESS	_			40				80	90	
	LESS	_							80	90	TOTAL
LESS -40 -30 -20	LESS	_			40				80	90	
LESS -40 -30 -20 -10	LESS	_		30	40 1 1	50			80	90	1
LESS -40 -30 -20	LESS	_		30	40 1	50			80	90	1
LESS -40 -30 -20 -10 10 20	LESS	_		30	40 1 1	50			80	90	1
LESS -40 -30 -20 -10 10	LESS	_		30	40 1 1	50			80	90	1

TABLE XVII
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE
STICK STEADY BY AIRSPEED

	COLLECTIVE PEAKS			COLL. S	TEADY 8	Y VELOC	ITY L	ESS			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS	5										
-40											
-30)			1		1					2
-20)			5	7	8					20
-10)		1		13	3	1				18
10)		1	1	4	1 8 3 1					7
20)										
30											
40											
TOTAL	L		2	7	24	13	1				47
TIPE	0.	0.3	26.8	209.7	454.4	126.8	3.8	0.	0.	0.	821.7

	COLLECTIVE	PEAKS	vs	COLL. S	TEADY BY	VELOC	ITY	40			
LFSS -4(10	20	30	40	50	60	70	80	90	TOTAL
-30 -20 -10 10 20 30))))		1	3 3 1	1 1	2 2					7 6 1
TOTAL	L		1	7	2	4					14
TIME	0.	0.8	7.6	31.4	46.2	19.0	0.7	0-	0.	٥.	105.1
	COLLECTIV	E PFAKS	VS	COLL. S	TEADY BY	r VELO	CITY	60			
LES -4		ro	20	30	40	50	60	7.0	50	90	TOTAL
-3 -2	0		3	1 8	1 10						2 21
-1	0		1	5	3	3					12
1 2			2	1	1						4
3	0										
ATOT	O L		6	15	15	3					39
TIPE	0.	0.1	82.0	350.7	457.1	152.3	2.3	0.	0.	0.	1044.5
	CULLECTIVE	PEAKS	vs	COLL. S	FEADY BY	VELOC	ITY	80			
LES	LESS	PEAKS	vs 20	COLL. S	feady by 40	VELOC 50	ITY 6C	80 70	80	90	TOTAL
LES! -40 -30	LESS S				40 1				80	90	1
-4(-3(-2(LESS D D			30	40 1 1	50			80	90	1 10
-40 -30 -20 -10	LESS D D D D		20	30	40 1	50			80	90	1
-40 -30 -20 -10	LESS D D D D D		20	30	40 1 1	50			80	90	1 10
-4(-3(-2(-1(1(2(3(4(LESS D D D D D D D D D		20	30 4 2	40 1 1	50 4 1			80	90	1 10 8
-40 -30 -20 -10 10 20 30 40	LESS D D D D D D D D D D D D D		1	30 4 2	40 1 1 5	50 4 1			80	90	1 10
-46 -36 -26 -11 10 20 36 40 TOTAL	LESS D D D D D D D D D D D D D	0.	1 1 24.8	30 4 2 6 212.3	40 1 1 5 7 305.2	50 4 1 5 99.6	6C 2.0	70			1 10 8
-46 -36 -26 -11 10 20 36 40 TOTAL	LESS 50 00 00 00 00 00 00 00 00	0.	1 1 24.8	30 4 2 6 212.3	40 1 1 5 7 305.2	50 4 1 5 99.6	2.0 CLTY	70			1 10 8
-46 -36 -26 -16 16 26 36 46 TOTAL	LESS COLLECTIV LESS S	O. E PEAKS	20 1 1 24.8 VS	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY	50 4 1 5 99.6 7 VELCO	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0
-4(-3(-2(-1) 10 2(3(4) TOTAI TIME	LESS O COLLECTIV LESS S O	O. E PEAKS	20 1 1 24.8 VS	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY	50 4 1 5 99.6 7 VELCO	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0 TOTAL
-4(-3(-2(-1) 10 2(3(4) TOTAI TIME	LESS O COLLECTIV LESS S O	O. E PEAKS	20 1 1 24.8 VS	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY 40 1 1 6	50 4 1 5 99.6 7 VELCO	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0 TOTAL
-46 -36 -26 -16 16 26 36 46 TOTAI TIME	LESS COLLECTIV LESS O O O O O	O. E PEAKS	20 1 1 24.8 VS 20	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY	50 4 1 5 99.6 7 VELCO 50	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0 TOTAL
-4(-3(-2(-1) 10 2(3(4) TOTAI TIME LES -4 -3 -2 -1: 12	LESS COLLECTIV LESS O O O O O O	O. E PEAKS	20 1 1 24.8 VS 20	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY 40 1 1 6 5	50 4 1 5 99.6 7 VELCO 50	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0 TOTAL 1 1 14 15
-4(-3(-2(-1) 10 2(3(4) TOTAI TIME LES -4 -3 -2 -1: 12	LESS O O O COLLECTIV LESS S O O O O O	O. E PEAKS	20 1 1 24.8 VS 20	30 4 2 6 212.3 COLL. S	40 1 1 5 7 305.2 TEADY BY 40 1 1 6 5	50 4 1 5 99.6 7 VELCO 50	2.0 CLTY	70 0. 85	0.	0.	1 10 8 19 644.0 TOTAL 1 1 14 15
-46 -36 -26 -16 16 26 36 46 TOTAI TIME LES -4 -3 -2 -1 1 2	LESS COLLECTIV LESS S O O O O O O O O O O O O O O O O O	O. E PEAKS	20 1 1 24.8 VS 20	30 4 2 6 212.3 COLL. S 30	40 1 1 5 7 305-2 TEADY BY 40 1 1 6 5 2	50 4 1 5 99.6 7 VELCO 50 2 6	2.0 CITY 60	0. 85 70	0.	0.	1 10 8 19 644.0 TOTAL 1 11 14 15 2

C	DLLECTIVE	PEAKS	vs	COLL. S	TEADY B	Y VELC	DC 1 TY	90			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40 -30											
-20				2	4	3					9
-10				2	6	_	1				9
10						1					1
20 30											
40											
TOTAL				4	10	4	1				19
TIME	0.	0.			414.8	167.6	4.3	0.	0:	0.	720.5
CO	LLECTIVE	PEAKS	٧S	COLL. S	TEADY BY	V VELO	CITY	95			
LESS -40 -30	LESS	10	20	30	40	50	60	70	80	9 0	TOTAL
-20 -10 10 20 30					3	4					8
40 TOTAL					7	8					15
TIPE	0.	0.	5.8	54.8	403.9	189.1	8.1	0.	0.	0.	661.7
co	LLECTIVE	DEAKS	vs	COLL. ST	TEADY HY	VELO	CITY	100			
C											-0-44
LESS -40	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-30						_					ě
-20					2	1					1 2
-10 10					•						•
20											
30											
40 TOYAL					2	1					3
TIME	c.	0.	2.0	26.7	261.6	207.0	4.4	0.	0,	0.	501.8
co	LLECTIVE	PEAKS	vs	COLL. S	TEADY BY	VELC	CITY	105			
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30 -20					3	1					4
-10 10 20 30					í	•					1
40 TOTAL					4	1					5
TIPE	0.	0.	0.7	34.5	168.4	226.1	4.0	0.	0.	0.	433.7

	COLLECTIVE	E PEAKS	vs	COLL. SI	EADY BY	VELOC	Y71	110			
. **	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LES	0										
-3: -2:						2					2 1
-1	0				1						1
2	0										
3	0										
TOTA	L				1	2					3
TIME	0.	0.	0.	55.6	71.2	183.2	6.0	0.	0.	0.	316.0
	COLLECTIV	F PEAKS	٧S	COLL. ST	TEADY BY	VELCO	ITY	115			
LES	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-4	0										
-3 -2											
-1 1	0			1							1
2	0										
4	0			_							
TOTA	iŁ			1							1
TIME	0.	0.	0.	8.2	47.8	137.3	1.8	0.	0.	0.	195.1
	COLLECTIV	E PEAKS	۷S	COLL. S1	FADY BY	VELOC	:ITY	125			
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LES	S	10		,,	70	30	UU UU		•	,,	TOTAL
-4: -3:	0										
-2 -1	0 0				ı						1
10	0										
2:	0										
TOTA					1						ı
TIME	0.	0.	0.	0.	7.3	17.4	1.7	0.	0.	٥.	86.4

TABLE XVIII COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK STEADY BY ROTOR RPM AND TOTAL

	COLLECTIV	F PFAK	s vs	COLL.	STEARY	BY RP	.	220			
LES: -4(+3)	0 0	10	20	30	40	50	60	70	80	90	TOTAL
-20 -10 10 20 30	0 0 0			6		i ! i	1				9 5 3
TOTAL	D			7	, 8	1	1				17
TIPE	0.	0.3	7.3				1.9	0.	0.	0.	610.1
LESS -40 -30 -20	COLLECTIVE	PEAKS 10	20	COLL. S 30 2 22	40 1 3 33	BY RPH 50 1 27	60	230. 70	80	90	TOTAL 1 6 87
-10 10 20 30 40			3	15 3	39 4	18 2	1				76 12
TOTAL			11	42	80	48	1				182
TIME	0.	0.9	137.1	1168.8	2700.6	1692.4	4G. 0	0.	0.	0.	5739.7
•	COLLECTIVE	PEAKS	vs	COLL. S	TEADY	BY RPM	ı T(DTAL			
LESS -40	LESS	10	20	30	40 1	50	60	70	80	90	TOTAL
-30 -20 -10 10 20 30			5 3 3	2 28 16 3	3 36 41 7	1 27 19 2	2				1 6 96 81 15
40 TOTAL			11	49	88	49	2				199
TIPE	0.	1.2	181.8	1326.4	3080.7	1824.5	42.7	0.	0.	0.	6457.2

TABLE XIX COLLECTIVE STICK PEAKS VERSUS AIRSPEED ACCELERATION BY MISSION SEGMENT

•		** ***			••••	~133. 36	v	,				
LESS	ress	-15.0	-12.0	-9.0	-4.0	-3.0	3.0	4.0	9.3	12.0	15.0	TOTAL
-40												
-30 -20 -10 10 20						5						2
-20 -10					1	25 119 205	13					134
io					•	205	23	1 3				134 231
20						11	4					15
30 40												
TOTAL					2	362	40	4				408
(COLLECT	IVE PE	MS VS A	CCELERA	FION BY	miss. s	EG. PA	MUAS				
	LESS	-15.6	-12.0	-9.0	-4.0	-3.0	3.0	6.0	9.0	12.0	15.0	TOTAL
LESS												
-40 -30						.2						20

	LESS	-15.0	-12.8	-9.0	-6.0	-3.0	3.0	4.0	9.0	12.0	15.0	TOTAL
LESS					2	3						5
-40					7	32	•					39
-30				2	44	315						383
-20				2	45	867	2					716
-10					7	310	- 1					310
10						122						155
20						11						11
30						Ł						1
40												
TOTAL				4	127	1463	•					1797

TABLE XX COLLECTIVE STICK PEAKS VERSUS AIRSPEED BY MISSION SEGMENT

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS								•							•	•	
-40																	
-40 -30 -20 -10 10 20	1		1														2
-20	•	3	10	3	1	1	2										26
-10	59	25	10 22 21	3	•		3	2	1		1	1					134
10	136	32	21		5	1 # •		5	5	4	1						231
20	•	5							1	1	1	i					15
30																	
40																	
TOTAL	208	45	54	14	15	15	13	7	7	•	•	2					488

	COLLECTIV	E PEAKS	S VS VEL	OCIIY B	A WIZZI	ON SEGM	ENT MA	IUVR									
	LESS	40	60	80	85	90	45	100	105	110	115	130	125	130	135	140	TOTAL
LES!		1			1												2
-3(-2() l	11	82	1 24	2	2 21	4	4	1	1							20 157
-10	3	11 14	82 28	26 14 13	5 19 4	21 11 11	15	13 13	i	3	1	•			•		119
-4(-3(-2(-1(2(11	•	21	13	•	3.4	13	1.9	•	•	•	•			•		***
30	D																
TOTAL	20	39	139	54	27	45	29	30	18	13	3	1	1		1		420

	LESS	40	60	80	85	90	75	100	105	110	115	120	125	130	135	140 TO
\$\$		1	3			1										
40	5	10	11	•	1	2										
30	49	2C2	113	7	5	7										
20	141	283	337	41	46	24 15	17 13	7	ı					1		
10	109	43	94	36	11	15	13	•	•	3	1					
40 30 20 10 10	110	•	3						1		1	1				
20	11															
30	-;															
40	•															
AL	424	>51	561		63	49	30	16	•	3	2	1		1		1
	720	,,,	,	••	•••	•••	••		_	-	_	•		_		•

TABLE XXI COLLECTIVE STICK PEAKS VERSUS RÓTÓR RPM BY MISSION SEGMENT

	COLLECTIVE	PEAKS	VS	RPM	BY	MISSION	SEG	MENT	ASCENT
	LESS	210	220	230		240	250	TOTA	L
LESS -4(
-30	-			2					2
-20		5	3	18					6
-10		3	38	88		5		13	
10			68	155		8		23	
20			8	7				1	5
30									
4(_
TOTAL	-	8	117	270		13		40	5
	COLLECTIVE	PEAKS	VS	RPM	87	MISSION	SEG	MENT	MANUVR
	LESS	210	220	230		240	250	TOTA	L
LES				_					_
-4			_	2		_		_	2
-3	_	17	1	17		1			0
-2 (•	8 24	129 88		13		15	
-1: 1:			28			7 2		11	
2			20	4		•		•	4
3				•					•
4									
TOTA		A	61	328		23		42	20
	COLLECTIVE	PEAKS	VS	RPM	BY	MISSION	SEG	MENT	DESCNT
	LESS	210	220	230		240	250	TOTA	L
LES	S			4		1			5
-4	_	1	2			2			9
-3		10	42			8		38	_
-2		10	159	731		18		91	
-1		1	107			7 1		31	
10		Ţ	42 6	77 5			1	12	1
3			0	1				•	1
31 41				•					•
TOTA		23	358	1378		37	1	179	7

TABLE XXII GUST $\mathbf{n_z}$ VERSUS AIRSPEED BY MISSION SEGMENT BY ALTITUDE BY GROSS WEIGHT

M.	t GUST	PEAKS V	S VEL.	BY HISS.	SEG. A	SCENT.	ALT- I	LESS, WG	1. 2000	X 0							
2.4 2.2 2.0 1.8 1.7	LESS	40	60	•0	8 5	90	95	100	105	110	115	120	125	130	135	140	TOTAL
1.5 1.4 1.3 1.2 0.8 0.7		2	2 1 3	•		1											2 6 5
0.5 0.4 0.2 LESS TOTAL		2	6	4		1											13
•	z Gust	PEAKS V	S WEL.	BY #ISS.	sec.	ASCENT,	MT. (LESS, 🕊	ST. 22 0 0) 0							
2.4 2.2 2.0 1.8 1.7 1.6 1.3 1.2 0.8 0.7	LESS	40	•	80	45	90	*5	100	105	110	115	120	125	136	135	146	1974.
0.4 0.2 LESS TOTAL			٠														•
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4	LESS	PEAKS V:	60 60	BV MIST.	SEG. A	SCENT, 90	4LT. L	.ESS, b G 10 0	T. 2400 105	110	115	120	125	130	135	140	TOTAL
1.2 0.8 0.7 0.4 0.5 0.4 0.2 LESS							1										1
																	•

M	GUST	PEARS V	S VEL.	BY MISS	. SEG.	ASCENT,	ALT.	LESS, W	*. 2000	90							
	LESS	40	•0	•0	85	•0	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5																	
1.3								ı	1								2
0.4 0.7 0.6 0.5 0.4							1		1								2
0.2 LESS TOTAL							1	1	2								4
362	t Gust	PEAKS 1	S WEL.	BY #155	. SEG.	ASCENT.	ALT.	LESS, WG	T. 3000	00							
	LESS		40	80	45	90	95	100	105	110	115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4			-	••							•••	•••					
1.2 0.8 0.7 0.6 0.5			1														1
0.4 0.2 i ESS Total			2														2
	, cust	PEAKS 1		BY MISS	. SEG.	ASCENT.	M.T.	1000. s e	T. LE	t e							
	LESS	40	60								115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.8 1.7 1.4 1.5	LESS	40	•0	•0	85	90	95	100	105	110	115	120	125	130	135	146	TOTAL 2
1.7 1.6 1.3 1.2 0.8 0.7 0.6 0.5	LESS	40	\$ 0								115	120	125	130	135	146	107AL 2
1.4 1.5 1.4 1.3 0.8 0.7 0.4	LESS	40	•0		85						115	120	125	130	135	146	
1.7 1.6 1.3 1.3 1.2 0.7 0.6 0.5 0.4 0.2 Less				80	2	•0	**	100	105	110	115	120	125	130	135	146	2
1.7 1.6 1.3 1.3 1.2 0.7 0.6 0.5 0.4 0.2 Less	Z GUST	PEAKS 1	'S VEL-	ey MISS	2 2 3. SEG.	TO	45.	100	105	110				•			2
1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7 0.4 0.2 1.5 1.7 0.4 0.7		PEAKS 1		ey MISS	2	•0	**	100	105	110	115	120	125	130	135		2
1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7 0.6 0.9 0.4 0.2 LESS TOTAL	Z GUST	PEAKS 1	'S VEL-	ey MISS PO	2 2 3. SEG.	TO	45.	100	105	110				•			2



MZ	GUST	PEAK S	. VS VI	EL. 81	ness.	SEG. A	SCENT.	ALT.	1000, w G	T. 2200	0							
	LESS		0	60	80	85	90	95	100	105	110	115	120	125	130	135	144	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4																		
1.2 0.8 0.7 0.6 0.5 0.4				1					i									2
LESS TOTAL				1					1									2
MZ	GUST	PEAK!	s vs v	EL. S'	r MISS.	SEG. A	SCENT,	ALT.	1000. MG	1. 2800	•							
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3	LESS	4	• 0	▲ 0	80	85	1 0	95	100	105	110	115	120	125	130	135	140	TOTAL
0.7 0.6 0.5 0.4 0.2 LESS										2								2
TOTAL										2								•
M	Z GUST	PEAK	s 15 V	EL. B	WISS.	SEG. 4	SCENT,	ALT.	1000.	1. 3000	0							•
2.4 2.2 2.0 1.8 1.7 1.6 1.5	LESS	•	+ 0	60	≢0	●5	•0	95	190	105	110	115	120	125	134	135	149	TOTAL
1.3 1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS				2	1													3
TOTAL				2	1	***			2000		. .							3
*								ALT.	2000. M	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.4 1.7 1.6	LESS	i	40	60	€0	**	90	77	100	100	*10	113	124	467	•#	137	.~	iviat.
1.5 1.4 1.3 1.2 0.0 0.7 0.6 0.5 0.4 0.2 LESS						1												1

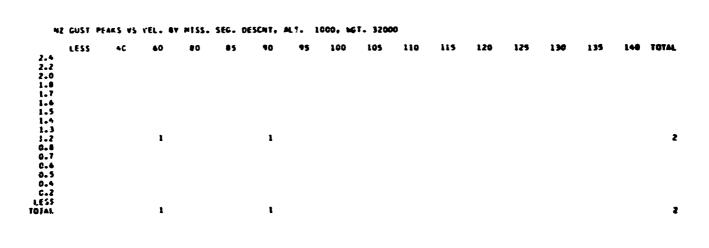
K.	Z GUS7	PFAFS VS	YeL. I	PY MISS.	1 'G. #	MUYR,	ALT. L	ess, w	T. 2000	ю							
A	LESS	40	◆ 0	80	05	+2	95	100	165	110	115	120	125	130	135	140	TOTAL
2.0 1.8 1.7 1.6 1.5																	
1.3			2	1	1	2	4	12	•	1			ı				36
0.7 0.6 0.5 0.4 0.2 LESS				1	7	•	•	•	2	ı							26
TOTAL			2	2	•	•	•	19	•	2			1				56
P.		PEAKS VS															
2.4 2.2 2.0 1.6 1.7 1.6 . 5	LESS	40	♦ 0	\$ 0	85	•0	95	100	105	110	115	120 <u>.</u>	125	130	135	140	TOTAL
1.2 0.8 0.7 0:4 0.5 0.4 0.2 LESS			1			1					2						2
TOTAL			ì			1					5						•
N.	Z GUST	PEAKS VS	VEL. I	W MISS.	SEG. P	MUVE.	. 1. 1	000 . NC	T. 2000	^							
							~			-							
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.5	LESS	43	•0	\$ 0	85	90	95	100	105	110	115	120	125	130 .	135	146	TOTAL
2.2 2.8 1.7 1.5 1.5 1.3 0.7 0.5 0.5 0.5 2.53							1				115	120	125	130	135	148	TOTAL 2
2.2 2.0 1.8 1.7 1.5 3.4 1.3 0.8 0.7 0.5 0.5 0.5	LESS	43	60	80	85	•6	1	1	105	110	115	120	125	130	135	146	2
2.2 2.0 1.8 1.7 1.5 3.4 1.3 0.8 0.7 0.5 0.5 0.5	LESS	4J PEAKS YS	••	BO IV MISS.	85 SEG. #6	•6	1	1	105	110		126	125	130	135	146	2
2.2 2.0 1.8 1.7 1.5 3.4 1.3 0.8 0.7 0.5 0.5 0.5	LESS	43	60	80	85	•6	1	1	105	110	115	120	125	130	135		2

```
MZ GUST PEAKS VS VEL. BY MISS. SEG. MANUVR. ALT. 1000. NGT. 28000
                  LESS
                                                                                                                                                  105
                                                                                                                                                                 110
                                                                                                                                                                                 115
                                                                                                                                                                                                                 125
                                                                                                                                                                                                                                                135
                                                                                                                                                                                                                                                                140 TOTAL
                                                                                                                                                                                                 120
2.4
2.2
2.0
1.8
1.7
1.6
1.5
1.4
1.3
0.8
0.7
0.8
0.7
0.8
0.7
                                                                                                                                                 105
                                                                                                                                                                 110
                                                                                                                                                                                 115
2.4
2.2
2.0
1.8
1.5
1.4
1.3
1.2
0.8
0.7
0.5
0.5
0.2
LESS
TOTAL
                                                                                                                                                                                                                                                                                    2
                 LESS
                                                                                                                                                                                 115
2.4
2.2
2.0
1.6
1.7
1.6
1.3
1.2
0.8
0.7
0.9
0.5
0.4
0.5
VOTAL
                                                                                                                                  100
                                                                                                                                                  105
                                                                                                                                                                 110
                                                                                                                                                                                 115
                                                                     80
                  LESS
 2.4
2.2
3.0
1.7
1.6
1.5
1.4
1.3
0.8
0.7
0.4
0.5
0.4
0.5
1.55
1.55
1.7
                                                                                                                                                                                                                                                                                   17
```

NZ	GUST	PEARS VS	VEL. E	Y MISS.	SEG.	DESCRIT.	M.T.	LESS, WE	7. 2200	•							
	LESS	40	40		05	•0	95	100	105	110	115	120	125	130	123	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5																	
1.3 1.2 0.0 0.7 0.6 0.5 0.4		2	3					1									3
LESS TOTAL		2	•					1									1
M	2 GUST	PEACS V	S VEL.	BY MESS.	. sec.	DESCRIT,	ALT.	LESS, ¼	2800	ю							
2.4 2.2 2.0 1.8 1.7 1.6 1.5	LESS	40	•0	80	85	+0	•5	100	105	110	115	120	125	130	135	140	TOTAL
1.3 1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS			1														2
TOTAL			•														•
*		PEARS V						1000. M			,,,	120	125	130	134	148	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6	2 GUST LESS		5 VEL.	8Y MISS. 80	. SEG. 85		ALT. 95	1000. M	;T. LES	110	115	120	125	130	135	148	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6								•	-		115	120	125	130	135	148	TOTAL
2.4 2.2 2.0 1.6 1.7 1.6 1.3 1.4 1.3 0.0 0.7 J.6 0.5 0.5 0.4 0.5	LESS	40	1	•0	85	10	95	100	105	110	115	120	125	130	135	146	ı
2.4 2.2 2.0 1.6 1.7 1.6 1.3 1.4 1.3 0.0 0.7 J.6 0.5 0.5 0.4 0.5	LESS	40 PEAKS V	1	•0	85	90 DESCAT.	95	100	105	110	115	120	125	130	135		ı
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.0 0.5 0.5 0.5 0.2 LESS TOTAL	LESS	40 PEAKS V	1 1 5 VEL.	ev miss.	. SEG.	DESCAT.	95 ALT.	1000 M	105	110							1

	LESS	40	60	60	85	90	95	100	105	110	115	120	125	1 30	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.4																	
1.5																	
1.4																	
1.3				_													_
1.2				1													1
0.			_														_
0.7			1														1
0.6																	
C.5																	
0.4																	
0.2																	
LESS																	_
																	2

MZ	GUST	PEAKS VS	VEL.	8v #155.	SEG.	CESCNT.	ALT.	1000. H	ST. 300i								
2.4 2.2 2.0 1.8 1.7 1.6	LESS	40	• 0	€ 0	85	•0	•5	100	105	110	115	120	125	130	135	140 7	TOTAL
1.4 1.3 1.2 0.8 0.7 0.6			3	i	ı												5
0.4 2.0 LESS TOTAL			3	ı	1												\$



	LESS	40	60	80	85	90	95	100	105	110	115	150	125	130	135	140	TOTAL
				1													1
				1						_							1
Z	GLST 1	PEARS VS 40	40 40	#155. #0	. SEG. ! 85	STEADY,	41. L	ESS, wG 100	7. LES 105	3 110	115	120	125	130	135	140	TOTAL
		•	•	••	••	~	,,										
						3	1	1		1	1						7
						1	1	ŧ		1							•
						4	2	2		2	1			_			11
2	43.7 GUST	5.7 PEAKS V	32.2 5 YEL. 1	10.4 By Miss	18.4 . SEG.	17.0 STEADY,	12.6 MT. 1	5.4 .ESS, W	2.4 T. 2000	1.3	1.7	1.5	0.4	0.	0.	0,	153-3
	LESS	40	40	80	45	70	95	100	195	110	115	120	125	130	135	140	TOTAL
		2	7 17	4 21	10	2 21	1 23	21	4 20	2 2 15	11	14	2 5	1			2 26 189
		•	24	21	14	19	19	15	14	19	14	•	2	•			173
			•	1				,	4	•	2						10
		•	52	47	52	42	43	40	42	42	29	23	•	1			408
	291.4	31.8	319.5	213.7	245.5	170.4	114.9	75.4	54.3	41.5	34.1	22.2	9.2	3.8	c.	0.	1652.9
	z GUST	PEAKS V	s vet.	BY #155	. sec.	STEADY,	ALT.	LESS. w	ST. 220	00							
	LESS	40	◆ 0	€0	25	90	**	160	105	110	115	120	125	130	135	140	TOTAL
						4	1				1	2 2 4					2
		2	14	10	•	3	•	•	5	2	•		1	_			64
		1	13	1	12	•	2	•	5	3	•	•	2	1			50 3
		3	27	11	21	13	7		10	10	•	12	3	1			139

MZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. LESS, MGT. 24000 LESS 40 60 80 85 90 95 100 105 110 115 120 125 130 135 140 TO 2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1 1.2 0.8 0.7 1 0.6 0.5 0.4 0.2 LESS TOTAL 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		LESS	40	40	80	85	10	95	100	105	110	115	120	125	130	135	140	TOTAL
1																		
1	1.5									1								1 2
2 1 1 NE 0.7 0. 0. 0. 0. 1.6 6.1 3.3 4.7 1.5 1.5 1.6 1.4 0.3 0. 0. NZ GUST PEARS VS VEL. 8V MISS. SEG. STENDY, ALT. LESS, NGT. 28000 LESS 40 60 80 85 90 95 100 105 110 115 120 125 130 135 140 TO 1.7 1.6 1.7 1.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9).8).7									1	•	•						1
TAL).5).4].2																	
M2 GUST PEAKS VS VEL. BV MISS. SEG. STEADV, ALT. LESS, MGT. 20000 LESS 40 60 60 65 90 95 100 105 110 115 120 125 136 135 140 TO 2.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	TAL	0.7	0.	0.	٥.	0.	1.6	6.1	3.3				1.0	1.4	0.3	٥.	•.	22.9
LESS 40 60 80 85 90 95 100 105 110 115 120 125 130 135 140 TO 1-2 1-2 1-3 1-4 1-5 1-5 1-6 1-7 1-7 1-7 1-7 1-7 1-7 1-7 1-7 1-7 1-7	•	•••	••	••		••		•••					•••	•••				
7.4 7.2 7.0 7.2 7.0 7.1 7.3 7.3 7.4 7.4 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5	N	t GUST	PEARS V	S VEL.	BY MISS	. SEG. :	STEADY.	MT.	LESS, W	iT. 2600								
1.2 1.2 1.2 1.3 1.4 1.5 1.6 1.7 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	l.7 l.4	LESS	40	40	80	8 5	90	95		105	110	115	120	125	130	135	140	TOTAL
AL 1 1 E 1.6 0.5 13.6 12.4 13.6 24.0 22.1 12.9 8.2 4.4 1.9 3.8 1.1 0. 0. 0. 1 WI GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. LESS, WGT. 28000 LESS .0 60 80 85 90 95 100 105 110 115 120 125 130 135 140 T0 2	.3 .2 .8 .7 .6 .5								1		1							1
#2 GUST PEAKS VS VEL. BY HISS. SEG. STEADY, ALT. LESS, MGT. 28000 LESS .0 60 80 85 90 95 100 105 110 115 120 125 130 135 140 T0 2	AL																	2
LESS .0 60 80 85 90 95 100 105 110 115 120 125 130 135 140 T0 40 40 40 40 40 40 40 40 40 40 40 40 40	€	1.6	0.5	13.4	12.4	13.4	24.0	22-1	12.9	4.2	4.4	1.4	3.8	1.1	0.	c.	0.	119.8
4	w2		PEAKS VS						-									
3 2 1 6 7 6 5 4 2 2 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	.2 .0 .8 .7 .6	LESS	•0	40	•9	15	10	95	100	105	110	115	120	125	130	135	140	TOTAL
	3 2 8 7 6 5 4 2			1						ı								1
F 7.2 1.6 10.4 10.6 6.7 4.4 5.4 6.2 1.5 1.8 5.2 4.3 1.2 0.2 0. 0. 1				1						1								a,

MZ	GUST	PEAKS VS	VFL. 0	Y MESS.	SEG. S	TEADY.	ALT.	LESS. M	T. 3200	ю							
	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7																	
2.0																	
1.6																	
1.7																	
1.6																	
1.5																	
1.3																	
1.3																	
C.										1							1
0.4										•							•
0.6 0.5																	
0.4																	
O.Z LESS																	
TOTAL										1							1
TIPE	2.0	0.	1.6	1.7	1.1	1.0	3.8	11.5	11.3	5.0	4.9	0.4	G.	0.	0-	0-	44.6

AZ GUST PEARS VS VEL. BV MISS. SEG. STEADV, ALT. 1C00, bGT. LESS

LESS 40 60 80 85 90 95 100 105 110 115 120 125 130 135 140 TOTAL

2.4
2.2
2.0
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1 1 1 2 9
0.7
0.8
0.7
0.4
0.2
1.855
TOTAL
1 1 1 2 6

41	t GUST	PEARS VS	VEL.	87 #ISS.	SEG. :	STEADY.	ALT.	1000, 6	GT. 220	00							
2.4 2.2 2.0 1.8	LESS	40	40	•0	85	40	•5	100	205	110	115	120	125	130	135	140	TOTAL
1.7 1.6 1.5 1.4 1.3					2			2	2	2			1				1
0.8 0.7 C.6 0.5 0.4 0.2					1		2	2	4	3	2	2					14
LESS					3		2	•	4	5	2	Z	2				24
TIPE	70.3	4.5	88.5	30.6	33.8	58.2	45.9	29.8	27.6	47.6	35.7	16.6	12.6	1.5	0.	0.	528.7
M2	GUST	PEAKS VS	VEL. 1	BY MISS.	SEG.	STEADY.	ALT.	1000, M	T. 2400	90							
2.4 2.2 2.0 1.8 1.7	LESS	40	6 0	●0	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
1.5 1.4 1.3 1.2 C.8 0.7 0.6						1		1				ı	ì				2
C.4 O.2 LESS TOTAL						1		1				ı	1				•
TIPE	5.2	1.0	19.6	4.9	16.7	18.3	16.3	10.2	14.1	25.3	10.3	5.7	2.5	0.	0.	٥.	145.0
MI	GUST	PEAKS VS	YEL.	BY MISS.				1000. W									
2.4 2.2 2.0 1.8 1.7 1.6	LESS	40	6 0	●0	85	90	45	100	105	110	115	120	125	130	135	140	TOTAL
1.4 1.3 1.2 0.8 0.7 C.6 0.5 0.4 0.2 LESS									i								1
TOTAL		_							1	3.5	0-	0.	٥.	0.	٥.	٥.	1 50.7
TIPE	c.5	0.	4.9	5.4	6.9	7.2	7.6	6.2	6.3	3.3	u•	٧.	4.	٧.	٧.	₩.	<i>7</i> 4.1

	J GUST :	PFARS U	S VEL.	AV MISS	. SEG.	STEADY.	At T.	1000. M	GT. 280	00							
	LESS	40	60	80	85	•0	95	100	105	110	115	120	125	130	135	140	FOTAL
2.4 2.2 2.0 1.8 1.7 1.4																	
1.4																	
1.2			3	2	1	1	10			1	1						10
0.7 C.6 0.5 0.4			2		•		1.	1		3		1					1
LESS TOTAL			•	2	5	1	23	1		5	1	1					41
TIPE	5.8	1.1	18.7	20.5	26.5	34.3	46.2	21.6	4.8	2.4	1-0	0.3	c.	0.	0.	0.	163.0
×	Z GUST 1	PEAKS V!	i VEL. (BY MISS.	. SEG. :	STEADY,	ALT.	10 00, w 0	ST. 3000	10							
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4	LESS	40	⊕ 0	80	45	•0	•5	106	105	110	115	120	125	130	135	140	TJIAL
1.4					1 5	1											. 2
0.6			•	7			2	2									20
0.7 0.6 0.5			•	3	5	1	2										17
0.4 0.2																	
LESS TOTAL			7	10	11	14	4	2									48
TIME	0.9	0.4	20.1	18.5	30.2	31.7	31.8	14.4	6.2	2.8	1.6	2.5	2.3	0.3	0.	c.	145.7
N	Z GUST (PEARS VI	S VEL.	BV #155.	. SEG.	STEADY.	ALT.	1000 . w	57. 3200 105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5				30	•				•••								
1.4 1.3 1.2 C.8 G.7 C.6 7.5 O.4 G.2							1										1
LESS TOTAL							1										1
TIPE	0.	0.	0.5	0.5	0.	C-5	1.6	5.9	2.2	1.7	1.0	0.2	0.	0.	0.	0.	14.9

N	Z GUS1	PEAKS	vs	VEL .	BY MISS.	SEG.	STEADY.	ALT.	2030. 1	ST. LES	is							
	LESS	4	0	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																		
1.8																		
1.7																		
1.5																		
1.3							1											1
0. 8 0.7																		
0.5																		
6.2																		
LESS TOTAL							1											1
TIME	2.4	0.		7.8	7.6	8.0	12.7	21.8	14-1	4.5	2.5	1.0	12.6	4.7	0.4	c.	0.	107.1
				£.	44 mice	***	****		2000 w	-7 200								
7	LESS			40	87 MISS.	85	90	95	2000, W	105	110	115	120	125	130	135 .	140	TOTAL
2.4 2.2		•		•	-	•,		•••				•••		•••		***		
2.0 1.8																		
1.7																		
1.5																		
1.3				1				1			2	1						5
0.8							1			2	2	5						10
0.6 C.5																		
0.4																		
LESS TOTAL				1			1	1		2	4	•						15
TIME	3.4	6.	0	76.6	50.5	66.9	64.8	75-1	94.4	87.7	30.6	25.8	19.0	10.5	1.0	9.	0.	412.4
					BY MISS.							•••		•••				****
2.4	LES	•	0	60	80	85	90	95	100	175	110	115	120	125	130	135	140	TOTAL
2.2																		
1.0																		
1.6																		
1.4											1	2						3
1.2 0.8 0.7										1	1	•						2
0.6										•	•							•
0.4 0.2																		
LESS										1	2	2						5
TIPE	1.	, 0.)	34.2	22.1	28.1	23.7	26.3	20.4	21.9	17.0	7.9	7.4	13.0	2.8	c.	0.	226.7
	-																	

NZ GUST PEACS VS VEL. BV MISS. SEG. STEADY, ALT. 2000 bGT. 28000

LESS 40 40 80 85 90 95 100 105 110 115 120 125 130 135 140 TOTAL

2.4
2.2
2.0
1.8
1.7
1.4
1.5
1.4
1.3
1.2 1 1 1 2
2
0.6
C.5
0.4
0.2
LESS
TOTAL 1 1 1 2
TIME 0.5 4.8 11.8 3.2 3.8 0.3 0.4 1.7 2.7 0.6 G.2 0. 0. 0. 0. 0. 0. 0. 30.3

TABLE AXIII GUST $\mathbf{n_z}$ VERSUS μ BY MISSION SEGMENT BY ALTITUDE BY C_T/σ

MZ GUST PEAKS VS MU BY MISS- SEG. ASCENT, ALT. LESS, CT/S 0.09

LESS 0.00 0.05 0.10 0.15 0.20 J.25 0.30 0.35 TOTAL

2.4
2.2
2.0
1.8
1.7
1.0
1.5
1.4
1.3
1.2
1.1
1.2
2
1.1
1.2
3
6.4
6.5
6.6
6.6
6.6
6.7

NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	1000,	CT/S 0.	09
	LESS	0.00	0.05	0.10	0.15	C.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					2	2				4
0.8										
0.7					1	. 3				4
0.6										
0.5										
0-4										
0.2										
LESS										
TOTAL					3	5				8

N	Z GUST	PEAKS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	1000. C	1/5 0.	17
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1-4										
1.3										
1.2					3					3
0.8										
0.7						3				3
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					3	3				6

	NZ GL	JST	PEAKS VS	MU	BY MISS.	SFG.	ASCENT,	ALT.	2000.	C1/S 0.	09
	٠.	ESS	0.00	0.05	0.10	0.15	.0.20	0.25	0.30	0.35	TOTAL
2.4	•										
2.2											
2.0)										
1.0											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2							1				1
0.1							•				•
0.7											
0.6											
0-5											
0.4											
0.2											
LESS							_				_
TOTAL	•						1				1

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	PANUVR,	ALT.	LESS, C	T/S 0.	06
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.7											
2.0											
1.6	3										
1.7	7										
1.6	5										
1.5	5										
1.4											
1.3											
1.2								1			1
0.1											
0.7					•	•					
0.6											
0.5											
0.4											
0.2											
LES!											
TOTAL								1			1

	IZ GUS	T	PEAKS VS	MU	BY MISS.	SFG.	MANUVR,	ALT.	LESS.	C1/S 0	.09
	LES	S	0.CO	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2						2	18	11			31
0.8											
C.7						2	22	4			28
G.6											
0.5											
0.4											
C.2											
LESS											
TOTAL						4	40	15			59

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	MANUVR,	ALT.	1000, C	1/5 0.	09
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	C.35	TOTAL
2.4	•										
2.7	2										
2.0											
1.0											
1.											
1.0											
1.											
1.4											
1.3											
1.							2				2
0.0							_				_
0.							1				1
0.6											_
0.9											
0.4											
0.2											
LES:											
TOTAL							3				3

N	Z GUST	PEAKS VS	MU	BY MISS.	SEG.	HANUVR.	ALT.	1000.	CT/S 0.	.12
	LESS	G.CO	0.05	0.10	0.15	G.29	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						5				5
0.8						_				
0.7						2				2
0.6						_				_
0.5										
0.4										
0.2										
LESS										
TOTAL						7				?
IUIAL						•				

	NZ	GUST	PEAKS V	S MU	57 PISS.	SEG.	MANUVR,	ALT.	20CC,	CT/S 0.	09	
		LESS	0.00	0.05	0.16	6.15	c.20	0.25	0.30	0.35	TOTAL	
2.4	•											
2.7	2											
2.0)											
1.0	3											
1.7	7											
1.6	5											
1.9	5											
1.4	•											
1.3	3											
1.2	2											
C. 1	3											
0.7	7						2				2	
0.6	5											
0.5	5											
0.4	•											
0.2	2											
LES!	5											
TOTAL	L						2				2	

	NZ	GUST	PEAKS VS	KU	BY MISS.	SEG.	DESCNT,	ALT.	LESS,	CT/S 0.	09
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.	4										
2.	2										
2.	0										
1.											
1.											
1.											
1.											
1.											
1.							2				2
i.				4	3	5	13	1			26
0.						-					
0.					7	6	7 2	1			21
o.					•	2	2				4
0.						_	_				-
0.											
ō.											
LES											
TOTA				4	10	13	24	2			53

	NZ	GUST	PEAKS VS	HU	HY MISS.	SEG.	CESCNT,	ALT.	LESS, CI	1/5 C.	12
		LESS	0.00	0.05	0.10	0.15	C.25	0.75	0.30	C.35	TOTAL
2.4											
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2						2					2
0.8						_					•
C.7						1					1
0.6						•					•
0.5											
0.4											
C.2											
LESS						•					•
TOTAL						3					3

	NZ	GUST	PEAKS	٧S	MU	BY.	MISS.	SFG.	DESCNE,	ALT.	1000,	C1/S	0.	09
		rfss	0.00)	0.05	(0.10	0.15	C.20	0.25	C.36	c o.	35	TOTAL
2.4														
2.7 2.0														
1.8														
1.7														
1.6														
1.5														
1.4														
1.3														
1.2								2						2
0.8														
0.7								1	ì					2
0.6														
0.5														
0.4														
0.2														
LESS								_	_					
TOTAL								3	l					4

NZ	GUST	PEAKS VS	MU	EY MISS.	SEG.	DESCRI.	ALT.	1000, CI	/S 0.	12
	LESS	0.00	0.05	0.10	0.15	C.20	0.25	0.30	0.35	TCTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4 1.3										
1.2					5					5
C.8					,					•
0.7					1	1				2
0.6					•	•				•
0.5										
0.4										
0.2										
LESS										
TOTAL					6	1				7

	NZ	GUST	PEAKS VS	MU	BA WIZZ"	SEG.	DESCRI,	ALT.	1000.	C1/5	0.15	
		LESS	0.00	0.05	0.10	0.15	0.20	0.75	0.30	0.3	35 T	CTAL
2.4												
2.2												
2.0												
1.8												
1.7												
1.6												
1.5												
1.4												
1.3												
1.2						2	1					3
0.8												
0.7												
0.6												
0.5												
0.4												
0.2												
LESS												
TOTAL	•					2	1					3

	NZ	GUST	PEAKS	٧S	MU	BY MISS.	SEG.	DESCRT,	ALT.	2000, C	1/5 0.	12
		LESS	0.C	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4												
2.2												
2.0												
1.6												
1.7												
1.6												
1.5												
1.4												
1.3							_					
1.2							1					1
0.8												
0.7	7											
0.6	5											
0.5												
0.4												
0.2												
LESS												
							1					
TOTAL	•						•					1

NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY:	AL1.	LESS,	C1/S 0	.06
	LESS	0.CO	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2 2.0										
2.0										
1.7										
1.6										
1.5										
1.4										
1.3						•				•
1.2 0.8						3				3
0.7						1				1
0.6						•				
0.5										
0.4										
0.2										
LESS										4
TOTAL						4				4
TIPE	2.9	20.5	1.9	0.7	1.0	8.0	3.6	0.	0.	38.7

NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY.	ALT.	LESS. C	1/5 0.	.09
	LESS	0.00	0.05	G.10	0.15	C.20	0.25	0.30	0.35	TCTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4							4			4
1.3					11	14	4			34
1.2				5	64	121	66	1		257
C.8										
0.7				8	58	98	69	1		234
0.6					5	3	5			13
0.5						2	6			8
0.4										
0-2										
LESS										
TOTAL				13	138	238	159	2		550
TIPE	64.5	389.4	50.7	93.4	745.6	915.0	238.9	3.8	0.	2502.3

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY,	ALT.	LESS, C	1/5 0.	12
_		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.2 2.0											
1.0											
1.											
1.6	5										
1.9											
1.4							•				•
1.3						1	2	2			2
0.1						•					,
0.							1	2			3
0.6	5										
0.9											
0.4											
6.2											
LES						1	3	4			8
1014	L					•	•	•			•
TIPE		0.	24.7	5.1	2.6	56.9	109.0	37.4	0.2	0.	235.9

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY.	ALT.	LESS,	CT/S	0.15
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.	S TOTAL
2.4	•										
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3											
0.6											
0.7								ı			1
0.0								•			•
0.5											
0.4											
0.2	?										
LESS	•										
TOTAL	•							1			1
TIME		0.	3.2	0.2	0.6	9.2	23.3	18.5	0.	0	. 55.1

NZ	GLST	PEAKS VS	HU	BY MISS.	SEG.	STEADY,	At T.	1000. C	1/5 0.	09
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3							1			1
1.2					8	18	19			45
0.8										
0.7					13	13	28			54
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1	31	48			100
TIME	35.7	171.9	33.3	57.4	535.0	801.8	271.8	4.9	0.	1911.9

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY,	ALT.	1000. C	1/5 0.	12
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4	•										
2.2											
2.0											
1.6											
1.7											
1.6											
1.5											
1.4											
1.3						1 15	1	2			2
1.2					1	15	24	2			42
0.1	,					13	22				20
0.6						13	22 1	4			39 2
0.5											~
0.4											
0.2											
LES:											
TOTAL					1	29	48	7			85
TIPE		2.6	11.4	2.5	7.4	98.5	285.9	70.4	0.	0.	478.8

	NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	STEADY,	ALT.	1000.	:T/S 0.	15
2.4 2.2 2.0 1.6 1.7 1.6	?	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
1.4 1.3 1.2 0.8	<u>}</u>					2	6				8
0.7 0.6 0.5	? •					1	2				3
0.4 0.2 LESS TOTAL	}					3	8				11
TIME		0.1	0.7	0.2	0.5	19.9	55.7	18.6	0.3	0.	95.9

NZ	GUST	PEAKS VS	HU	BY MISS.	SEG.	STEADY.	ALT.	2000. C	T/S 0.	09
	LESS	0.CO	0.05	0.10	0.15	C.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6 1.5										
1.4										
1.3										
1.2					1	1	6			8
0.8					•	-				
0.7						1	8			9
0.6										_
0.5										
0.4										
0.2										
LESS						_	• •			
TOTAL					1	2	14			17
TIME	4.9	1.4	1.2	14.0	190.3	489.3	189.2	9.1	0.	859.4

LESS 2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7	9.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7									
2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7									
1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7									
1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7									
1.6 1.5 1.4 1.3 1.2 0.8 0.7									
1.5 1.4 1.3 1.2 0.8 0.7									
1.4 1.3 1.2 0.8 0.7 0.6									
1.3 1.2 0.8 0.7 0.6									
1.2 0.8 0.7 0.6									
0.8 0.7 0.6									
0.7 0.6				1	2				3
0.6									
					1	2			3
0.5									
0.4									
0.2									
LESS									
TOTAL				1	3	2			6

TABLE XXIV GUST n_z VERSUS μ BY MISSION SEGMENT

	LESS	0.60	0.05	0.10	0.15	0.20	0.25	C.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3					2					2
1.2					2 17	6				23
0.8										
0.7			2	3	2	9				16
0.6										
0.5										
0.4										
0.2										
.ESS										
TAL			2	3	21	15				41

N	Z GUST	PEAKS VS	MU	BY MISS.	SEG.	PARUVR				
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TCTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.2					_	36	• •			
0.8					2	25	12			39
0.7					2	27				
0.6					~	27	4			33
C.5										
0.4										
0.2										
LESS										
TOTAL					4	52	16			72

NZ	GUST	PEAKS VS	MU	BY MISS.	SEG.	DESCNT				
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	C.30	0.35	TOTAL
2-4										
2.2										
2.0										
1.8										
1.7										
1.6 1.5										
1.4										
1.3						2				•
1.2			4	3	17	14	1			2 39
0.8			•	•	• • •	• •	•			37
0.7				7	9	9	1			26
0.6				•	9	9	•			4
0.5						_				•
0.4										
C.2										
LESS										
TOTAL			4	10	28	27	2			71

TABLE	XXIV	- contd.
-------	------	----------

-- 12-2

N	GUST	PEAKS VS	MU	BY MISS	. SEG.	STEADY				
	LESS	0.00	0.05	0.10	0.15	C.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8 1.7										
1.6										
1.5										
1.4							4			4
1.3					12	17	10			39
1.2				6	92	175	95	1		369
0.8 0.7						120	114			247
0.6				8	85 5	139	114	1		347 15
0.5					,	2	6			8
0.4						•				•
0.2										
LESS										
TOTAL				14	194	337	235	2		782
TIME	110.8	623.6	95.2	195.6	1680.7	2176.1	955.2	20.0	0.	6457.3

TABLE XXV GUST n_z VERSUS AIRSPEED BY MISSION SEGMENT

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	148	TOTAL
2.4																	
2.2																	
4.0																	
2.2 2.0 1.8 1.7															-		
1.6																	
1.5																	
1.4			,														•
1.2			15	5	3	1		1	1								23
0.0						_											
0.7		2	5		į.		3	2	3								16
0.5																	
0.4																	
0.Z																	
LESS		_		_	_	_	_	_	_								
TOTAL		2	19	5	4	1	3	3	4								41

TA	RI	Æ	XXI	7 _	contd.
- 44		بنده	222	, -	LUMBU

ės.	Z GUST	PEAKS V	S NEL.	221M YB	. SEG.	MANUVR											
2.4 2.2 2.0 1.8 1.7	LESS	40	6 0	80	85	70	95	100	105	119	115	120	125	130	135	140	TOTAL
1.5 1.4 1.3 1.2 0.8 0.7 0.4			2	1 2	i •	4 5	5	15	7	1	2		i				39 33
0.4 0.2 LESS TOTAL			3	3	10	•	•	23	10	2	z		1				72
•	Z GUST	PEAKS V	S YEL.	22 IN VB	. SFG.	DESCAT											
2.4 2.2 2.0 1.4 1.7 1.6	LESS	40	•0	●0	85	••	95	100	105	110	115	120	125	136	135	146	TOTAL
1.4 1.3 1.2		5	13	4	2	7		3	1								2 39
0.8 0.7 0.6 0.5 C.4		5	•	2	3	3	3	2		1							26
LESS TOTAL		10	22	•	11	10	3	5	1	t							71
N	Z GUST	PEAKS V	S VEL.	BY MISS	. see.	STEADY											
2.4 2.2 2.0 1.8 1.7 1.6	LESS	40	60	₩0	e 5	90	•5	100	163	110	115	120	125	130	135	146 1	19744.
1.4		•	7 45	42	1 36	7	2	5 34	5 32	2 2 30	1 27	21 2 2	3 7	ı			39 30
1.2 0.0 0.7 0.6 0.5 0.4		,	**	30 1	40	33 1	39	22	30	42	33	10	5	1			347 15
LESS TOTAL		9	105	77	77	25	87	44	n	*	63	43	15	2			762
TIME	621. 7	105.1	1044.5	444.0	705.1	726.5	461-7	501.8	433.7	316.0	195.1	128.6	86.4	13-2	0.	•. •	457.3

TABLE XXVI GUST n_z VERSUS µ

	RZ G	UST PEA	45 V\$ 1	NU CO	NPOS LTE					
.4 .2 .0	LESS	9.00	0.05	00	0.15	c-50	0.25	0.30	0.35	TOTAL
.7			4	•	14 128	19	4 10 100	1		43 47(
).8).7].6].3			2	1.0	** 7	184	119	1		422
1.2 \$5 AL			•	21	247	431	253	2		964

TABLE XXVII GUST n_z VERSUS AIR. PEED

	ress	40	60	80	85	10	95	100	105	110	115	120	125	130	135	L46 TOTAL
2.°																
2.0																
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 C.7																
1.7																
1.4										2		2				
1.3			72	52	3	7 56	2 51	5 53	5 41	2 31	29	2 2 21	3			47
1-5		4	72	55	40	56	21	53	41	31	29	21	•	1		47
0. T		12	64	34	53	41	49	32	34	44	33	18	5	1		42
		••	•	34 3	•••	i		32 5		44	33	•••	-	•		1
D.6 D.5									•	•						1
0.4 0.2																
U.Z ESS																
TAL		51	149	93	105	105	102	95	86	87	45	43	16	2		**

TABLE XXVIII MANEUVER nz VERSUS AIRSPEED BY MISSION SEGMENT BY ALTITUDE BY GROSS WEIGHT

	LESS	40	46	80	85	90	95	100	67. LE! 105	lio	115	120	125	130	135	140	TOTA
2.4 2.2 3.6 1.8 1.7			•		•						•••						
1.5 1.4 1.3			•		1												
C.8 9.7 9.6	1	1	1		•												
0.5 0.4 0.2																	
LESS	1	1	5		1												
N	S NAMEUN																
2.4	LESS	40	60	80	85	•0	95	100	105	110	115	120	125	1.30	135	140	TOTA
2.2 2.0 1.8 1.7 1.6 1.5																	
1.3	l 3	1	17	•	2	3	4			1							3
0.8 0.7	16	;	13	3			2		2								3
0.6 0.5 0.4 0.2			ı			1			1								
LESS TGTAL	50	3	31	11	2	4	•		3	1							•
MZ	MANEUVE			7 MISS.					1. 22001								
2.4 2.2 2.0 1.8 1.7 1.6 1.5	LESS	40	40	60	85	**	95	100	105	110	115	120	125	136	135	140	TOTAL
1.3	4		16		1		1	2									32
6.8 6.7 6.6	7		5 1		1			1									14
0.5 0.4 0.2																	
LESS OTAL	11	•	22		2		1	3									47
MZ	MANEUVE	as vs	WEL. BY	MISS.	SEG. 45	icent.	ALT. L	ess. w	1. 26000								
2.4 2.2 2.0	LESS	40	60	80	85	40	95	100	105	110	115	120	125	130	135	140	TOTAL
1.0 1.7 1.6 1.5 1.4 1.3																	
0.8			1														1
0.7 0.6 0.5																	

MZ	MANEUVI	ERS VS	VEL. O	v miss.	SEG. A	SCENT.	ALT. L	ESS, 16	1. 2000	10							
	LESS	40	40	80	83	10	95	100	105	110	115	120	125	150	135	140	TOTAL
2.4 2.2																	
2.0																	
1.8 1.7																	
1.6 1.5																	
1.4																	
1.2			1														1
0.8 6.7	2		1		1												•
0.6 0.5																	
0.4 C.2																	
LESS	_		_		_												5
TOTAL	2		2		1					_							-
M	MAMENA	ea s vs	VEL. 8	Y MISS.	SEG. 4	SCENT,		.ESS, M									****
2.4	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2																	
2.0 1.8																	
1.7 1.6																	
1.5																	
1.3																	
1.2																	
0.7 8.6			1														1
0.5			-														
6.4 9.2																	
LESS			1														1
86,	E MANEUY	HRS VS	VEL. 8	Y MESS.	SEG. A	SCENT.	A.I. 1	1000. ×									
	LESS	HRS VS	VEL. 8	MISS.	SEG. A	SCENT. 90	41. 1 95	1000. 1 00	105	110	115	120	125	130	135	140	:STAL
2.4 2.2											115	120	125	130	135	140	:STAL
2.4 2.2 2.0 1.0											115	120	125	130	135	140	:GTAL
2.4 2.2 2.0 1.8 1.7											115	120	125	130	135	148	SOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5											115	120	125	130	135	148	COTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5	LESS		60	•0							115	120	125	130	135	140	SOTAL
2.4 2.2 2.0 1.8 1.7 1.4 1.3 1.3	LESS	40			85						115	120	125	130	135	148	,
2.4 2.2 2.0 1.0 1.5 1.4 1.3 1.3 6.8	LESS		60	•0							115	120	125	130	135	140	
2.4 2.2 2.0 1.6 1.7 1.4 1.3 1.3 1.8 0.7	LESS	40	60	•0	85						115	126	125	130	135	140	,
2.4 2.2 2.0 1.7 1.5 1.5 1.3 0.6 0.6 0.5	LESS	40	60	•0	85						115	126	125	130	135	148	3 3 1
2.4 2.2 2.0 1.0 1.7 1.6 1.3 1.2 0.7 0.6	LESS	40	60	•0	85						115	120	125	130	135	140	,
2.4 2.2 2.0 1.6 1.7 1.5 1.3 1.3 1.3 0.8 0.7 0.6 0.5 0.5 0.5	LESS 1 1 1 3	1	1	1	1	10	95	โบริ	105	110	115	120	125	130	135	140	3 3 1
2.4 2.2 2.0 1.6 1.7 1.5 1.3 1.3 1.3 0.8 0.7 0.6 0.5 0.5 0.5	LESS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 1 1 VERS VS	1 1 VEL. 6	ao 1 1	1 1 SEG. A	90	95 ALT. 1	100	105	110							3 3 1
2.4 2.2 2.0 1.8 1.7 1.5 1.3 1.3 1.3 0.0 0.7 0.5 0.5 0.5 0.5	LESS 1 1 1 3	1	1	1	1	10	95	โบริ	105	110	115	120	125	130	135	140	3 3 1
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	LESS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 1 1 VERS VS	1 1 VEL. 6	ao 1 1	1 1 SEG. A	90	95 ALT. 1	100	105	110							3 3 1
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	LESS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 1 1 VERS VS	1 1 VEL. 6	ao 1 1	1 1 SEG. A	90	95 ALT. 1	100	105	110							3 3 1
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	LESS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 1 1 VERS VS	1 1 VEL. 6	ao 1 1	1 1 SEG. A	90	95 ALT. 1	100	105	110							3 3 1
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	LESS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 1 1 VERS VS	1 1 VEL. 6	ao 1 1	1 1 SEG. A	90	95 ALT. 1	100	105	110							3 3 1 7 70TAL
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	LESS 1 1 1 1 1 LESS	40 1 1 VERS VS	1 1 VEL. 0	1 1 V MISS.	1 1 SEG. A	90 90	95 ALT. 1	100 100 100	105 1. 2000 105	110							3 3 1 7 70TAL
2.4 2.2 2.0 1.7 1.5 1.4 1.3 2.0 0.4 2.0 0.5 0.5 0.5 1.7 1.5 1.7 1.5 1.7	LESS 1 1 1 1 1 LESS	1 1 1 145 V3 40	1 VEL- 0	1 1 V MISS. 80	1 1 SEG. A 85	SCENT. 90	95 95 1	100 100 100 5	105	110					135		3 3 1 7 7 TOTAL 1 37
2.4 2.2 2.0 1.7 1.5 1.4 1.3 2.0 0.4 2.0 1.7 1.5 1.7 1.5 1.7 1.5 1.7 1.5 1.7 1.5 1.7 1.5 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	LESS 1 1 1 1 1 LESS	40 1 1 VERS VS	1 1 VEL. 0	1 1 V MISS.	1 1 SEG. A 85	90 90	95 ALT. 1	100 100 100	105 1. 2000 105	110				130	135		3 3 1 7 7 707AL
2.4 2.2 2.8 1.7 1.5 1.4 1.3 2.8 0.6 0.5 0.5 0.5 0.5 1.7 1.6 1.3 1.6 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.7 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	LESS 1 1 1 1 1 LESS	1 1 1 145 V3 40	1 VEL- 0	1 1 V MISS. 80	1 1 SEG. A 85	SCENT. 90	95 95 1	100 100 100 5	105 1. 2000 105	110				130	135		3 3 1 7 7 TOTAL 1 37
2.22.00 1.76 1.52 1.65 1.32 1.65 1.32 1.65 1.32 1.65 1.65 1.65 1.65 1.65 1.65 1.65 1.65	LESS 1 1 1 1 1 LESS	1 1 1 145 V3 40	1 VEL- 0	1 1 V MISS. 80	1 1 SEG. A 85	SCENT. 90	95 95 1	100 100 100 5	105 1. 2000 105	110				130	135		3 3 1 7 7 707AL
2.42 2.81.7 1.7 1.5 1.4 1.3 1.3 1.3 1.3 1.3 1.3 1.3 2.4 2.2 2.0 1.7 1.3 1.4 1.3 1.4 1.3 1.4 1.3 1.4 1.3 1.4 1.3 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	LESS 1 1 1 1 1 LESS	1 1 1 145 V3 40	1 VEL- 0	1 1 V MISS. 80	1 1 SEG. A 85	SCENT. 90	95 95 1	100 100 100 5	105 1. 2000 105	110				130	135		3 3 1 7 7 707AL

42	MANEUV	EAS VS	YEL. 8	Y #155.	SEG. /	ISCENT,	4.1.)	1006° AC	7. 2200	0							
	LESS	40	60	50	45	90	95	100	105	110	115	120	125	1 30	135	140	TOTAL
2.4		•••	-	-			••						•••	•••	•	• • • •	
2.2 2.6																	
1.4																	
1.7																	
1.5																	
1.4																	
1.2	1		1				1	2	1						1		7
0.7			4		1			1	1								7
0.6 0.5																	
0.4																	
CESS 0-5																	
OTAL.	ī		5		ı		1	3	Z						1		14
N.	e maneur	veas vs	VEL.	. * * 155.	SEG.	ASCENT,	ALT.	1000. *	T. 2400	10							
	LESS	40	40	80	83	90	45	190	105	110	115	150	125	130	135	140	TOTAL
2.+ 2.:																	
2-0																	
1.0																	
i.4 1.5												•					
1.4																	
1.3	1		1				2										•
0.0	-						_										
6.7 6.6			1			1											8
0.5																	
0.2																	
LESS	1		2			1	2										•
N	2 MANEU					-		1000, M	· ·	-							
2.4	LESS	40	40	40	45	10	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2																	
1.4																	
1.7																	
1.5																	
1.4																	
1.2	t																1
0. <i>0</i>	1		1														2
0.6 0.5																	
0.4																	
2.9 2231																	
TOTAL	5		1														3
R.	MANEU!	veas vs	VEL. C	Y MISS.	SEG.	ASCENT,	ALT.	1000. M	T. 2800	10							
2.4	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2																	
2.0																	
1.7																	
1.6 1.5																	
1.4																	
1.3 1.2		1															1
0.7				1													1
5.6				•													•
0.5 C.4																	
0.2																	
LESS		ı		1													2
																	-

Mä	MANEUV	ERS VS	VEL. 4	Y MISS.	SEG. A	SCENT.	ALT. I	aca, be	T. 3000	0							
2.4	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	140	10-41
2.2 2.0 1.8 1.7 1.6 1.5																	
1.3			1	ı			ı										1
0.8 0.7 0.6 0.5 0.4 0.2 LESS			1														1
TOTAL			2	1		****			7 166	•							•
*	Z MAMEUY LESS	76#3 V3 40	•0	30 at wise.	85	90	M. 1 95	100	T. LES 105	110	115	.120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.0 1.7 1.6 1.5 1.4	CESS	70	•••	ı	•3	70	77	100	147	•••		,		••	•••		1
C.8																	•
0.7 0.4 0.5			1	1	1		1										ĭ
0.4				1													1
'ESS TOTAL			1	4	1		1										7
N.	Z MANEUY	ÆRS VS	VEL. E	Y MISS.	SEG. A	SCENT.	ALT. 2	000. v e	T. 2000	o							
N.	Z MANEUY LESS	IERS VS 40	VEL. E	W MISS.	SEG. A	SCENT,	ALT. 2	000 , w 6	T. 2000	0 110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.7 1.6 1.5 1.3 1.2 0.7 0.7 0.5 0.5											115	120	125	150	135	146	107AL
2.4 2.2 2.0 1.7 1.4 1.3 1.2 0.7 0.8	LESS		1	3	3	•0	1		105		115	120	125	130	135	140	1
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.6 0.7 0.6 0.5 0.4 0.5	2	40	1 1	3 2 1	3 2	• • · · · · · · · · · · · · · · · · · ·	1 3	100	105	110		120	125	130	135	140	1 14 12 1
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.0 0.7 0.6 0.5 0.4 0.5 0.2 1.835 TOTAL	2	40	1 1	3 2 1	3 2	• • · · · · · · · · · · · · · · · · · ·	1 3	100	105	110	115	120	125	130	135		1 14 12 1
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.8 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	CESS 2 2 2 2 2 2	40	1 1 2	3 2 1 6	3 2 5 SEG. A	90 4 2 4 5CENT.	1 3 4 ALT. 2	100 · wG	105 1 2 3	110							1 14 12 1

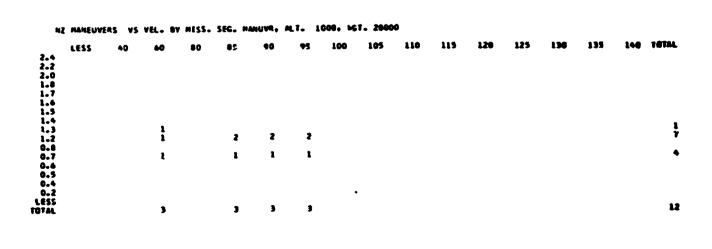
N	Z PANEU	vers v	S WEL. (N MISS.	SEG.	ASCENT.	ALT.	2000. =	51. 260	00							
• •	LESS	40	40	80	85	10	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0																	
1.0																	
1.6																	
1.4																	
1.2																	
0.7																	1
0.5 6.4 0.2																	
LESS OTAL			1														1
	LIBRAR S	VERS ÝS		N MISS.	SEG.	mahuvr,	ALT.	LESS. W	;T. LES	is							
2.4	LESS	40	•0	80	85	90	95	100	105	110	115	120	129	130	135	140	TOTAL
2.2 2.0																	
1.7																	
1.5																	
1.4																	
1.2 0.0 0.7	1		•														1
0.6	•																
0.4 0.2																	
LESS TOTAL	1																1
MI	MANEUV	ERS VS	VEL. 8	Y MISS.	SEG. #	IANLYR,	ALT. L	ESS, 6	T. 2000	0							
2.4	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	140 T	OTAL
2.0																	
1.0																	
1.6 1.5 1.4																	
1.3		1	2	1 3	1	1 3	1	5	1	1 3							7 29
0.8		-	_	-	-		•	4	4	2 2			2				26
0.4				1				2		2							5
0.4														1			1
LESS TOTAL		1	2	5	1	15	11	14	11				2	1			48
42	MANEUV	ers vs	VEL. BY	MISS.	SEG. M	MIUYR,	M.T. L	ESS, 161	. 22000)							
2.4	LESS	40	60	•0	65	90	95	100	105	110	115	120	125	130	135	148 T	STAL
2.4 2.2 2.0																	
2.0 1.6 1.7 1.6																	
1.5 1.4 1.3																	
1.3				1 3	2	2	1		1			1					1 10
C.8				-	•	1	1		1			•	1	1			5
0.6						-	-						-	•			
0.4																	
LESS TOTAL				4	2	3	2		2			1	1	1			16

20	MANEUV	ERS VS	VEL. 8	Y MISS.	SEG. M	ANUVR,	ALT. L	.ess. w	T. 2600	10							
2.4 2.2	LESS	40	40	80	85	•0	95	100	105	110	115	120	125	130	175	140	TOTAL
2.0 1.8 1.7 1.6 1.5																	
1.4 1.3 1.2 0.8		2	1		1												•
0.7 0.6 0.5 0.4 0.2						1											1
LESS TOTAL		2	1		1	•											5
K,	Z MAMEUV	ers vs	VEL. 8	Y MISS.	SEG. P	ANUYR,	ALT. L	ESS. WG	T. 3000	•							
2.4	LESS	49	60	80	05	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2 2.0 1.8 1.7 1.6 1.5																	
1.3 1.2 0.8 0.7 0.6 0.5 0.4	2																2
LESS TOTAL	2																2
96 2	NUSMAN 3	ERS VS	VEL. B	Y MISS.	SEG. P	ANUVA,	ALT. 1	0CO. WG	T. LES	s							
	LESS	ERS VS 40	VEL. 8	80 80	SEG. P	ANUVR,	ALT. 1	000. w G	T. LES	S 110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5											115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.4 1.3 1.3											115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.6 0.7 0.4	LESS	40				•0					115	120	125	130	135	140	
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.7 0.8 0.7 0.4 0.4 LESS TOTAL	1	40 1	60	80	25	1 1	95	100	105	110	115	126	125	130	135	140	3
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 0.7 0.8 0.7 0.4 0.4 LESS TOTAL	LESS 1 2 RANGUY	40 1	60	80	25	1 1	95	100	105	110	115	120	125	130	135	140	3
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.4 0.5 0.4 0.2 LESS TOTAL N	1	40 1	60	# MISS.	25	1 1	95	100	105	110	115	120	125	130	135		3
2.4 2.2 2.0 1.7 1.4 1.3 1.4 1.3 0.6 0.4 0.2 1.7 1.5 1.7 1.6 1.7	LESS 1 2 RANGUY	i I Iers vs	60	BO W MISS.	95 SEG. #	1 1 2 ANUVR. 90	95	100 100, MC	105 105	110							3 1 4 107AL
2.4 2.2 2.0 1.7 1.4 1.4 1.3 1.3 1.3 1.3 1.3 1.4 1.3 1.4 2.2 1.7 1.5 1.4 1.7 1.4 1.4 1.7 1.4 1.4 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	LESS 1 2 RANGUY	1 1 1ERS VS	**EL. 8	# MISS.	\$5 \$EG. #	90 1 1 1 2 AMUYR, 90	95 ALT. 1 95	100 100c, wg 100	105 105 105	110							3 1 4 4 107AL
2.4 2.2 2.0 1.7 1.5 1.4 1.3 0.4 0.5 0.4 0.2 LESS TOTAL N	LESS 1 2 MANGUY LESS	1 1 1ERS VS 40	60 VEL. 8	# MISS.	\$5 \$5 #S	1 1 2 ANUVR. 90	95 ALT. 1 95	100 100, MC	105 105	110							3 1 4 107AL

TABLE XXVIII - contd.

															4 2 4	140 101
L	ESS	40	60	•0	85	93	95	100	105	110	115	120	125	130	135	140 101
			3	1			3								1	
			_	•			-									
		1					1							1		
				1												
•																
		1	3	2			4							1	ı	

MZ	MANEUVE	es vs	VEL.	BY MISS.	SEG.	PARUYR,	MT.	1000. 1	6 7. 2400	0							
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2																	
2.0																	
1.8																	
1.5																	
1.4																	
1.3 1.2						1	3	2									•
0.8 C.7					2	2		2									•
0.6																	
0.4 0.2																	
0.2 LESS																	12
TOTAL					5	3	3	•									••



44	MANEUL	ÆRS VS	VEL.	SY MISS.	SEG.	PARUVR,	A.T.	1000.	GT. 3000	N)							
	LESS	40	60	80	85	93	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.4																	
1.3 1.2 C.8 0.7 0.4 0.9 C.4			1							1							2
LESS			1							1							2
*	Z MANEU	vers vs	VEL.	87 MISS.	. sec.	MANUVR,	ALT.	2000.	ET. 2000	X							
2.4 2.2 2.0 1.8 1.7 1.4	LESS	40	40	€0	63	•0	•5	109	105	110	115	120	129	130	135	140	TOTAL
1.3		1 2	3	ı	4	,	2					1	1				10
0.8 0.7	2		4	3	3	1	1				1						15
9.4 9.4 0.2			•				1				1						15 1 1
LESS	2	3	•	4		•	•				2	1	1				37
	IZ MAMEU	IVERS V	s vel.	BA w122	. 586.	- MANUAL	M.T.	2000.	16 7. 220	96							
	LESS	vers v 40	S VEL.		. 586. 89		4LT.			110	115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.8 1.7 1.3 1.3 1.3 1.3 0.7 0.8 0.8 0.5 0.5				1							115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.7 1.0 1.3 1.4 1.3 0.0 0.7 0.0 0.4 0.2 LESS TOTAL	LESS	+0	1	1	81	1 10	•5	100	165	119	115	120	125	130	135	146	a
2.4 2.2 2.0 1.7 1.0 1.3 1.4 1.3 0.0 0.7 0.0 0.4 0.2 LESS TOTAL	LESS	+0	1	1 t at #155	81	i 90	•5	100	165	119	115	120	125	130	135	100	2

-- Can

	S WWWENA	EUZ AZ	YEL. 1	N MISS.	SEG. (ESCAT,	ALT.	LESS. 🛰	T. LES	is.							
• •	LESS	40	40	80	85	90	93	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6																	
1.4	1		1														1
1.2	5	i	•	1	2	1	1										20
0.7	1	t	7		1	3											12
0.5 0.4			1														1 1
0.2 LESS TOTAL	7.	2	19	1	,	•	1										37
	Z MANEUV			Y MISS.		ESCNT.		.ESS. w	T. 2000	10							•
• •	LESS	40	60	80	05	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5						•											
1.3 1.2 0.6	10	•	1 35	3	15	12	7	•	3	3							117
6.7 G.4	13	5	.51	1:	4	7 2	2	3	1	•	1 2						70 6 3
0.5 0.4	1			2													3
0.2 LESS		••	57	25	21	22			•	7	3						204
TOTAL	33 MANEUVE	14 FRS VS	VEL. B		SEG. D		ALT. L	ess, wel	. 2200								•
-	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2 2.0 1.8 1.7																	
2.0 1.8 1.7 1.6 1.5	2 3					1											2
2.0 1.8 1.7 1.6 1.5 1.4 1.3	2 2 2	•	10	1	2	1 3	2			1							34
2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 6.7	2 2 2 4	4 3	19	1 2 2	2 2		2	2		1							2 3 34 20 2
2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7				2		3	z	2		1							34
2.0 1.8 1.7 1.6 1.5 1.4 1.2 0.8 0.7 0.6				2		3	2	2		1							34
2.0 1.8 1.7 1.6 1.5 1.3 1.2 0.8 6.7 0.5 0.5 0.5 0.2 LESS	•	3	21	2	2	3 1	2		' • 24 00 0	Ł							34 20 2
2.0 1.7 1.6 1.3 1.4 1.3 1.2 0.7 0.6 0.7 0.4 0.2 LESS TOTAL	14	3	21	\$	2	3 1 5	2	2	*• 24 00 0 105	Ł	115	120	125	130	135	140	34 20 2
2.0 1.8 1.7 1.4 1.3 1.2 0.8 0.7 0.5 0.4 0.5 0.4 2.2 2.5 2.4 2.2 2.0 1.7	14 MANEUVĒ	3 7 RS VS	51 51	2 2 5 7 MISS.	2 4 SEG. DE	3 1 5 (SCNT. /	2 MLT. LI	2 ESS, 6 61		1	115	126	125	130	135	144	94 20 2
2.0 1.7 1.5 1.5 1.4 1.2 0.8 0.5 0.4 0.2 LESS TOTAL 2.4 2.4 2.2 2.0 1.7	14 MANEUVĒ	3 7 RS VS	51 51	2 2 5 7 MISS.	2 4 SEG. DE	3 1 5 (SCNT. /	2 MLT. LI	2 ESS, 6 61		1	115	126	125	130	135	140	94 20 2

ş

```
ME MAREUVERS VS VEL. BY MISS. SEG. DESCRIT, AL.
                                                                                                                                                                                             140 TOTAL
                                                                                                                                              120
                                                                                                                                                          152
                                                                                                                                                                                 135
2.4
2.2
2.0
1.7
1.6
1.5
1.3
1.2
0.8
0.7
0.4
0.5
0.4
0.5
                                                    ı
                                                                                                                                                                                                          10
        ME MANEUVERS VS VFL. BY MISS. SEG. DESCRI, ALT. LESS, MGT. 28000
                                                                                                                                  115
                                                                                                                                                          125
                                                                                                                                                                                 135
                                                                                                                                                                                             140 TOTAL
             LESS
2.4
2.2
2.0
1.8
1.7
1.6
1.5
1.4
1.3
0.8
0.7
0.8
0.7
0.4
0.5
1.5
1.7
       ME MANEUVERS VS VEL. BY MISS. SEG. DESCRIT, ALT. LESS, WET. 30000
                                                                                                                                   115
                                                                                                                                                                                 135
2.4
2.2
2.0
1.8
1.7
1.6
1.3
j.2
0.8
0.7
0.9
0.5
0.4
6.2
LESS
FOTAL
         NZ MANEUVERS VS VEL. BY MISS. SEG. DESCRIT, ALT. LESS. GGT. 32000
                                                                                                                                    115
                                                                                                                                                120
                                                                                                                                                            125
 2.4
2.2
2.0
1.6
1.7
1.6
1.3
1.2
0.8
0.7
0.9
0.4
0.5
0.4
0.4
```

No.

84	E MANEUY	ERS VS	VEL. 0	Y MISS.	SEG. 0	ESCMT.	ALT. 1		T. LES	s							
2.4	LESS	40	40		85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2 2.6 1.8																	
1.7 1.6 1.5 1.4		1				1											2
1.3 1.2 0.8		ì	11	1 3	3	2	1	2		•			1				21
0.7 0.5 0.4 0.2 LESS			î	•	•		1	1		1			•				12
TOTAL		3	10	4	•	3	2	5		1			2				40
84	Z MANEUV	ERS VS	VEL. B	Y #155.	SEG. 0	ESCHT,	A.T. I	1000, NG	T. 2000	•							
2.4	LESS	40	60	# 0	85	46	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2 2.0 1.8 1.7 1.6			1														
1.4 1.3 1.2	1	1	10	12		7	1	3	2	1		3					1 0 N
0.8 0.7 6.6	4 2	•	15	7	11	4	2	2									47
0.5 0.4 0.2 LESS																	
TOTAL	15	13	40	21	19	15		•	2	1		3					140
ni	MAMEUV			Y MISS.				900, kG									
2.4 2.2 2.0 1.8 1.7	LESS	ERS VS 40	46L. 8	Y MISS. BO	85 es	ESCHT. 90	ALT. 1 95	909, 1 6	T. 2200 105	116	115	126	125	130	135	146	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5		40	1				45				115	129	125	130	135	146	
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4	LESS 1	1 1	1 1 3	3	e 5	**	1 10	100			115	120	125	130	135	146	2 3 37
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7 0.6	LESS	40	1 1	80	83	***	95	100			115	126	125	130	135	146	
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.0 1.3 1.2 0.8 0.7	LESS 1	1 1	1 1 3	3	e 5	**	1 10	100			115	126	125	130	135	146	2 3 37
2.4 2.2 2.0 1.8 1.7 1.5 1.3 1.3 1.2 0.8 0.7 0.3 0.4 0.3	LESS	1 1 3	1 1 3 3 2 1	3 2	3 3	** ** ** **	1 10 12	3 1	105	116	115	120	125	190	135	146	2 3 37 19 1
2.4 2.2 2.0 1.8 1.7 1.6 1.3 1.4 1.3 1.2 0.9 0.7 0.6 0.9 0.4 2.2 1.6 2.4 2.2 2.0 1.8 1.7 1.6	LESS 1 6 2	1 1 3	1 1 3 3 2 1	3 2	3 3	** ** ** **	1 10 12	3 1	105	116	115	120	125	130	135		2 3 37 19 1
2.4 2.2 2.9 1.8 1.7 1.6 1.3 1.4 1.3 1.4 1.2 0.6 0.7 0.6 0.3 0.4 0.2 1.5 1.7 1.7	6 S FERREIN TERMINATION OF THE PROPERTY OF THE	1 1 3 5 ERS VS	1 1 3 3 2 1 1 6 VEL. 6	80 3 2 5 7 MISS.	3 3 3 586. D	96 6 5	1 10 1 12 M.T. 1	3 1	105 T. 2400	116							2 3 37 19 1

			VEL. 0			-	_	1000. W			115		124		124	144	70704
2.4 2.2 2.0 1.8 1.7 1.6	LESS	••	••	80	e 5	**	**	100	109	110	115	120	125	130	139	140	TOTAL
1.4 1.3 1.2			1														1
6.7 6.4 6.5 0.4 6.2 LESS	ı		1					2									•
TOTAL	1		3					2									•
104	LESS	ERS VS 40	WL. 1	W M155.	SEG. 0	escut,	ALT. 1	100 ×	105	110	115.	130	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5	Cess	~		•	•,	**	•		200				127				_
1.3 1.2 0.8 0.7 0.6 0.5 0.4		1	. s	3	1												•
LESS TOTAL		1	5	•	1												11
N.	Z MANEUW		VEL. D				-	, 16		-							
2.4 2.2 2.0 1.0 1.7	ress	40	••	80	6 5	**	93	100	105	110	115	120	125	. 130	139	144	TOTAL
1.5																	
1.5 1.4 1.3				1	1		1										1 2
1.3 1.2 0.6 0.7 0.6 0.5	2	1 2	10	2	1 5 2	5	1 1	\$		1							34
1.3 1.2 9.6 9.7 9.6	5	_		•	5		1										2
1.3 1.2 0.0 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	MANEUVE S	2 3 85 VS	15 YEL. 8 1	7 7 7 MESS.	s 2 8 SEG. DE	5 13 SCHT, A	1 3 5 LT. 20	4 100, uc1		1 2							2 30 20 61
1.3 1.2 9.9 9.7 9.6 9.5 9.2 LESS TOTAL NZ 2.4 2.2 2.0 1.8	a	3	15	* 2	5 2	13	5	•	. 22000 105	2	115	120	123	130	135	140	\$4 34 5
1.3 1.2 9.0 9.7 9.0 9.5 9.4 9.2 LESS TOTAL NZ	MANEUVE S	2 3 85 VS	15 YEL. 8 1	7 7 7 MESS.	s 2 8 SEG. DE	5 13 SCHT, A	1 3 5 LT. 20	4 100, uc1		1 2	115	120	125	130	135	140	2 30 20 61

*	Z MANEUY	ERS VS	YEL.	GY MISS.	586.	DESCRIT,	A.T.	2000, 1	61. 260	10							
2.4	LESS	40	60	80	85	••	95	100	105	110	115	120	125	130	135	140	TOTAL
2.2 2.9 1.6 1.7 1.6 1.5																	
1.2 Q.8 0.7 0.6 0.5 0.4 0.2 LESS	1		1	ı													1
TOTAL	1		2	1													•
MZ	MANEUVI			Y HISS.		-		-	T. 3000								
2.4 2.2 2.6 1.6 1.7 1.6 1.5 1.4	LESS	40	••	••	85	•0	**	100	105	110	115	120	125	130	195	140	TETAL.
1.2 0.6 0.7 0.6 0.5 0.4	1		Ł	1	1												3
LESS TOTAL	ı		1	1	1												•
W.Z	MAMEUVI	eas vs	VEL. B	Y MISS.	SEG. 1	DESCRY.	MI.	1000. W	ST. 3200	•							
42	MANEUVI LESS	es vs	VEL. 8	N MISS.		DESCRY,	ALT. 1				115	120	125	130	135	100	TOTAL
2.4 2.2 2.0 1.8 1.7 1.3 1.4 1.3 1.2 6.8 6.7 6.6 6.5 6.5	LESS	40	•	••	85	**	1	100	103	110	115	120	125	130	135	100	1 t
2.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 1.2 6.8 6.5 6.5 6.5 6.5	RANEUW	40	•		85	**	1	100	105	110							1
2.4 2.2 2.0 1.8 1.7 1.3 1.4 1.3 1.4 1.3 0.7 0.0 0.3 0.4 0.2 1.5 1.5 1.6 1.7 1.6 1.7	LESS	40 48 YS	VEL. B	eo V MISS.	es	DESCRY,	1 1 ALT. ;	100 2000, b6	103	110	115	120	125	130	135		1 TermL
2.4 2.2 2.0 1.0 1.7 1.5 1.4 1.3 0.0 0.5 0.6 0.2 1.5 TOTAL R2 2.4 2.2 2.0 1.0 1.7 1.5 1.5	RANEUW	40 48 YS	vel. B	eo V MISS.	es	10	1 1 ALT. ;	100 2000, b6	105	110							1
2.4 2.2 2.0 1.8 1.7 1.3 1.4 1.3 1.4 1.3 0.6 0.6 0.2 LESS TOTAL M2 2.4 2.2 2.0 1.6 1.5 1.6	MAMEUVI	40 48 YS	VEL. 8	eo V MISS.	85 85	DESCRY,	1 1 ALT. 3	100 2000, b6	105	110							1 TermL

	LESS	40	40	80	25	90	95	100	105	110	115	120	125	130	135	140	TOTAL
9.4		•	-	•	• • •	•••	**		,	•••		***	•••	•	•••	• • • •	
2.7																	
2.0																	
1.4																	
1.7																	
1.4											1						1
2.4 2.2 2.0 1.8 1.7 3.6 1.5 1.4 1.3 1.2 0.8											ĭ						1 4 27 299
1.4			2								Ž	7					Ā
1.3	1 10	1	7	1		2	3	1	3	3	4		1				27
1.2	10	•	41	34	39	20	37	43	35	12	7	7	Ž				299
0.8																	
0.7	•	•	49	19	28	30	30	24	₹1	16	10	14	•	2			271 26
0.6	1		2	•	2	1	3	2	3	1	1	2	1	1			26
0.5				2				1									3
0.4																	
0.2										1							1
LESS				_		_			_		_			_			
TOTAL	16	11	101	62	69	61	73	71	62	33	34	23	12	3			633
TIPE	291.4	31.0	310.5	213.7	245.5	170.4	114.9	75.4	50.3	41.5	34-1	22.2	9.2	3.8	0.	٥.	1452.9

	LESS	40	60	90	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4						••		•••		•••	•••	•••	•••				
2.2			•														
2.0																	
1.6																	
1.7																	
1.6																	
1.5																	
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2							_										_
1.3		1	1			_	3										1.
1.2		•			•	•	3										1.0
6.7			2	2		•	5										17
			-	-		•	•	ī									ï
0.4 0.5								_									•
0.4																	
7.2																	
LESS			_	_				_									
TOTAL		1	3	2	1	13	11	5									36
TIÆ	43.7	5.7	32.2	10.4	18.6	17.0	12.6	5.4	2.4	1.3	1.7	1.5	0.4	ø.	٥.	٠.	153.3

M2	PAMEUV	ERS VS	VEL. E	N N155.	SEG. DI	ESCAT.	ALT.	2000. 6	T. 2800	X 0							
2.4 2.2 2.0 1.4 1.7 1.4 1.3 1.4	LESS	40	60	80	05	90	95	100	105	110	115	120	125	130	135	140	TOTAL
1.2 0.8 0.7 0.6 0.5 0.4					1		1	ı									1
C.2 LESS TOTAL					1		1	1									3

TABLE XXVIII - contd	TA	BI	Æ	XX.	VIII	_	contd
----------------------	----	----	---	-----	------	---	-------

	NZ MANEU	VERS 1	/S YEL.	BY HISS	. SEG.	STEADY,	MT.	LESS, W	6T. 220	00							
2.4 2.2 2.0	LESS	40	60	80	45	10	45	100	105	110	: 15	150	125	130	135	140	TOTAL
1.8 1.7 1.6 1.5 1.4 1.3	3 10	•	2 34	14	10	14	3 11	7	1	4	1	•	z	2			3 10 135
0.8	13	1	24	11	17	7	•	•	•	•	7	5	2	•			
0.6 0.5 0.4 0.2 LESS			1	3		1	3		1		i	_	-				115 10 1
TOTAL	24	5	64	32	35	22	26	16	14	•	•	11	•	2			274
TIME	108.7	21.2	109.6	61.4	73.4	74.1	54.1	45.3	40.0	28.7	12.8	9-5	2.4	•.•	•.	6.	734.7
	IZ MANEU	VERS V	'S VEL.	ev MISS.	. sec.	STEAGY,	41.	LESS, w	6T. 240	20							
2.4	LES\$	40	♦ 0	80	85	10	95	100	105	110	115	120	125	130	135	146	1074
2.2 2.1 1.8 1.7 1.6 1.5 1.4																	
1.2 0.0 0.7							1		1								2
0.5 0.4 0.2 LESS TOTAL							2		2								4
TIPE	0.7	0.	0.	0.	•.	1.6	4-1	3.3	4.7	1.5	1.5	1.4	1.4	•.3	••	••	22.9
es.	r maneuv	ERS V	s vel. (N MISS.	sec. :	STEADY.	ALT. L	.E35. v c	T. 2488	•							
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4																	
1.2 0.8 0.7 0.6 0.5	1		4		1		1		ı	3	1	2					10
e.z	_				_		_		_		_						
TOTAL	1	0.5	•	12 4	1	34.5	1	12.9	ı	•	1	5			_	_	19
TIME	1.6	4.7	13.4	12.4	13.4	24.0	22.1	16.7	4.2	4.4	1.9	3.0	1.1	••	••	₹.	119.0

42	MANEUN	EAS VS	VEL.	OY MISS.	SEG. 1	STEADY.	A.T.	LESS. M	ST. 2006	10							
2.4 2.2	LESS	40	•	80	45	••	93	100	105	110	115	120	125	130	139	100	TOTAL
2.0 1.0 1.7 1.4 1.3 1.2 0.7 0.6 0.7					ı					2		1	1				3
LESS TOTAL					ı					2		2	3				•
TIME	7.2	1.4	10.4	10.4	4.7	4.9	\$.4	6.2	1.5	1.8	5.2	4.3	1-5	0.2	•.	••	75.2
2.4	ress watern	reas vs	VEL. (90 84 #122.	\$86. S	ITEADY.	4LT. (LE is , w	105	110	115	120	125	130	135	144	TOTAL
2.2 2.0 1.8 1.7 1.6 1.3 1.3 1.2 0.8 0.7 0.5	3		1														•
0.2 LESS TOTAL	3		1														•
	21.7	•.	5.3	2.3	0.1	1.1	0.9	•.	٥.	٥.	0.	•-	•.	0.	•.	•.	32.3
12.4 2.2 2.0 1.8 1.7 1.5 1.4 1.3 1.2 0.8 0.7 0.5	MANEUV			NY MISS.				.ESS. 66			115	120	125	136	135	146	7674L
0.2 LESS TOTAL											•						
									1	5	1						7

•	IZ MANEU	VERS V	IS VEL.	84 w(\$5	. SEG.	STEADY	, ALT.	1000, 1	IGT. LE	SS							
2.4 2.2 2.0	LESS	40	40	€0	45	90	95	100	105	110	115	120	125	130	135	146	TOTAL
1.6 1.7 1.6 1.5																	
1.3			1	1	1	1 2	5	2	1	1		1					10
0.8 0.7 0.6 0.5			2	1	1	4	1	1	1	1		1	1				19
0.4 0.2 LESS TOTAL			5	3	2	7	•	3	2	2		2					33
TIME	14.2	0.5	21.0	22.3	20.2	13.4	8.6	10.1	8,4	14.2	2.3	3.6	3.4	•.	0.	•.	143.5
*	Z MANEU	VERS V	s vel.	BA WIZZ	. sec.	STEACY.	ALT.	10 0 0, w	6T. 200	••							
	LESS	40	40	60	85	70	95	100	105	110	115	120	125	136	135	140	TOTAL
2.4 2.2 2.0 1.0 1.7																	
1.5			2		1		1										•
1.3	3		17	1 7	i 13	21	į	10	•	15	1	2					143
0.8 C.7	1	1	12	,	20	13		12	5	10	•	-					102
0.6 0.5 0.4 0.2	•	•	2	i		1			3	•••	•	•					2
LESS TOTAL	4	2	33	16	32	34	33	31	14	25	26						263
TIPE	159.8	10.6	227.3	140.1	194.4	145.6	121.4	95.1	72.7	35.9	23.0	11.5	17.5	1.8	0.	•.	1254.9
œ:	Z MAMEUN	rees v	s vel. (.221M YA	. sec.	STEADY.	ALT.	1800. W	ST. 220	.							
	LESS	40	40	80	85	90	95	100	105	110	115	120	125	130	135	146	TOTAL
2.4 2.2 2.0 1.6 1.7			-		-												
1.6																	
1.4 1.3 1.2 0.6	1		•	•	5	1	2	•		•	3	2	2				3
8:7 6.6 0:5 0.4			2	4	7	•	11	7	1	3	2	3					44 2 1
0.2 LESS TOTAL	ı		•		12	13	30	16	2	7	5.	5	2				110
TIME	70.3	•.5	80.5	30.0	33.0	50.2	45.9	29.8	27.6	47.6	35.7	14.6	12.6	1.9	•.	0.	526. 7

	LESS	40	40	80	85	90	95	100	105	110	113	120	125	130	135	140	TOT
						1		2		2	•	•					
7					1	Ť	1	1	2	1	1	2					
2 5 L					1	1	1	3	2	3	7	•					
	5.2	1.0	19.4	4.9	10.7	18.3	16.3	10.7	14.1	25.3	10.3	5.7	2.5	0.	•.	••	145
NZ	MANEUL	ers v	; YEL. 6	N MISS.	. SEG. :	STEADY,	ALT.	1000, w	5 1. 240	00							
•	LESS	40	40	•0	85	90	95	100	105	110	115	120	125	130	135	140	10
2 0 8 7 6 5 4 3 2 8 7																	
2							ı										
6 5 4 2						1	1	1		1							
S						1	2	1		1							
	0.5	0.	4.9	5.8	4.9	7.2	7.6	●2	4.3	3.5	0.	0.	0.	0.	0.	••	94
N.	L MANEU	VERS V	S VEL.	DV MISS	. sec.	STEADY,	ALT.	10 00 , k	61. 28 (100							
.4	LESS	40	60	•0	85	90	95	100	105	110	115	120	125	130	135	140	T
.0 .8 .7 .6 .5																	
.4 .3 .2				1	1	2	3	3									
7					2	1	2										
.5																	
.8 .7 .6 .5 .4 .2				1	4	3	5	3									

	LESS	40	40	80 84 WESS.	85	90	95	1000, wG	105	110	115	120	125	130	135	140	TO TAL
2.4 2.2 2.0 1.8 1.7 1.6																	
1.4 1.3 1.2			2	1	1	3	1	2									2 10
0.8 0.7 0.6 0.5 0.4 0.2			3	1	ı	ı						1					7
LESS			7	2	2	•	1	2				1					10
TIME	0.9	0.4	20.1	18.5	30.2	31.7	31.8	14.4	8.2	2.6	1.6	2.5	2.3	0.3	0.	••	165.7
n)	MANEU!	ÆRS V:	i VEL. (BY MISS.	. SEG. :	STEADY.		:0C0, u C									
2.4 2.2 2.0 1.8 1.7 1.6 1.5	LESS	40	60	40	85	90	43	130	105	110	115	120	125	130	135	140	TOTAL
1.3			3	2	5	2	7	1	1								1 24
0.8 0.7 0.6 0.5 0.4 0.2 LESS				1	2	3	•	1									13
TOTAL			3	3	7	5	13	•	1						_	_	36
TIME	2.4	0.	7.8	7.6	8.0	12.7	21.0	14.1	9.5	2.5	1.0	12.6	5. 7	8.4	0.	5.	107.1
•	L MANEU	YERS Y	s vel.	BY MISS.	. SEG. :	STEADY,	ALT.	2000, 🕊	1. 2000	10							
2.4 2.2 2.0 1.8 1.7 1.6	LESS	40	60	€0	e 5	••	95	100	105	110	115	120	125	130	135	146	TOTAL
1 4				1	16	1 12	•	; 10	10	•	•						3 79
1.4 1.3 1.2	1		•	•						_	_						
1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7 0.6 0.5	1		•	?	16	16	2	11	i	3	3.		1				79
1.4 1.3 1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	1			7		16 1 30	9 2 17	22	20	10	*.		1				70 7
0.7 0.6 0.5 0.4 0.2 LESS		6.0	4	7	16		2		1			19.0		1.0	٥.	9.	

	LESS	40	60	80	85	•0	95	103	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.6 1.7 1.6		~															
1.3					2				1	1	_						
C.8			3	•	•	1	•	3	1	2	3						33
0.7 0.6 0.5 0.4 6.2			3	•	5	1	7	1		•	2	2	1				35
LESS			•	•	13		16	4	2	7	5	2	2				73
IPE	1.7	0.	36.2	22.1	20.1	23.7	26.3	20.4	21.9	17.0	7.9	7.4	13.0	2.8	0.	0.	226.7
M.2	MANEUT	IERS VS	. VEL. !	BY MISS.	. SEG. :	STEADY.	ALT.	2000. w	1. 240) 0							
	LESS	40	60	•0	85	70	95	106	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.6 1.7 1.6 1.5																	
1.3							1		•	1							16
0.8 0.7 0.4 0.5 0.4								2		2	1						,
LESS							1	2	•	3	t						15
e i me	0.	1.6	9.9	3.2	3.9	7.6	7.1	6.3	9.3	6.7	12.7	4.7	1.5	0.	0.	0.	78.4
Ni	t MANEU	VERS V:	S VEL.	BY PISS	. SEG.	STEADY,	M.T.	20 ca. w	67. 2 60	00							
3.4	LESS	40	60	40	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0 1.8 1.7 1.4																	
1.2						1											1
0.7						t			1								2
0.5																	
0.5 0.4 0.7 LESS OTAL						2			1								3

TABLE XXVIII - con	atd.	COL	-	III	/XX	Æ	I	B	A	T
--------------------	------	-----	---	-----	-----	---	---	---	---	---

: Can.

*	IZ MANEU	YERS V	S YEL.	87 WISS	. SEG.	STEADY.	A.T.	2000, L	GT. 280	00							
2.4 2.2 2.0 1.8 1.7	LESS	40	40	80	65	90	95	100	105	110	115	130	125	130	139	140	TOTAL
1.6 1.5 1.4 1.3 1.2							1										1
0.7 0.6 0.5 0.4 0.2 LESS				ı				1									2
TOTAL	0.5	4.8	11.0	1 3.2	3.0	0.3	1 0.4	1 1.7	2.7	0.8	6.2	•.	٥.	g.	٥.	a.	3 30.3
NZ	MANEUV	ERS VS	VEL. B	Y MISS.	sec. s	TEADY.	ALT. 2	200. bÇ	7. 3 00 0	•							
2.4 2.2 2.0 1.8 1.7 1.6	LESS	40	6 0	■0	a 5	90	95	100	105	110	115	120	125	130	135	140	TOTAL
1.4 1.3 1.2 0.6 0.7 0.6 0.5 0.4 0.2 LESS										i							t
TOTAL TIME	c.	0.	0.	1.0	1.0	2.4	5.0	2.4	1.9	0.÷	0.4	0.1	9.	٥.	•.	•.	14.9

TABLE XXIX MANEUVER n_z VERSUS μ BY MISSION SEGMENT BY ALTITUDE BY C_T/σ

M2 MANEUVERS VS MU BY MISS. SEG. ASCENT. MLT. LESS, ET/S 0.06

LESS 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 TGTAL

2.4
2.2
2.0
1.8
1.7
1.4
1.3
1.2
0.8
0.7
1
1
1
1
1
0.6
0.7
1
1
0.6
0.7
1
1
0.6
0.7
1
1
1
1
1
1
1
1
3

NZ	MANEU	VERS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	LESS, C	:1/5 0.	09
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4						_				•
1.3		1 5	_		43					2 74
1.2		5	2	12	43	11	1			/4
0.8	_		_	_						
0.7	1	15	7	8 1	17	6				54
0.6				1	1					2
0.5							1	•		ī
0.4										
0.2										
LESS	•		_			10	•			122
TOTAL	L	21	9	21	61	18	2			133

NZ:4	MANEUY	ÆRS VS	6 3	BY MISS.	SEG.	ASCENT,	ALT.	LESS.	CT/S O.	12
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3					1					1
1.2 0.8										•
0.7		1	1	1	1	1				5
0.6		•	•	•		•				
0.5										
0.4										
0.2										
LESS										
TOTAL		1	ì	1	2	1				6

NZ	MANEU	ERS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	LESS.	CT/S 0.	15
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7										
0.6					1					1
0.5					•					_
0.4										
0.2										
LESS										
TOTAL					1					1

N	Z MANEU	VERS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	1000. C1	:/S 0.	09
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4						_				_
1.3		_		_		1	_	_		1
1.2		5		1	17	19	1	1		44
0.8		_	_	_	_	_	_			
0.7		2 1	1	4	9	9	1			56
0.5		1			_					1
0.5						1				1
0.4										
0.2										
LESS		_		_			_	_		
TOTAL		8	1	5	26	30	3	1		73

NZ	MAHEUV	ERS VS	MU	BA MIZZ.	SEG.	ASCENT,	ALT.	1000.	CT/S 0.	12
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2		2		1	2	4				9
0.8										
0.7		1		1	2	2				6
0.6										
0.5										
0.4										
0.2										
LESS										_
TOTAL		3		2	4	6				15

	NZ	MANEUV	ERS	٧S	MU	BY MISS.	SEG.	ASCENT,	ALT.	1000.	CT/S	0.1	15
		LESS	0.0	0	0.05	0.10	0.15	0.20	0.25	0.30	0.	35	TOTAL
2.4													
2.2													
1.6													
1.7													
1.6													
1.5													
1.4										~			
1.3	.						1			`			1
1.2							1	1					1 2
0.1													
0.7													
0.6													
0.9													
0.4													
0.2													
LESS							Z	1					3
IUIAL	•						•						3

NZ	MANEU	/ERS VS	MU	BY MISS.	SEG.	ASCENT,	ALT.	2000,	CT/S	0.09
•	LESS	0.CO	0.05	0.10	0.15	0.20	0.25	0.30	0.3	35 TOTAL
2.4										
2.2 2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1	1			2
1.2					4	8	1			13
0.8			_		_					
0.7	1		1		4	12				18
0.6						1				2
0.5 0.4						1				1
0.2						•				•
LESS										
TOTAL	1		1		9	23	2			36

LESS 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 TOTAL 2.4 2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS TOTAL	1	NZ	MANEUV	ERS	٧S	MU	BY MISS.	SEG.	ASCENT,	ALT.	2000.	CT/S	0.1	12
2.2 2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 1 3 4 0.8 0.7 0.6 0.5 0.4 0.2 LESS			LESS	0.0	0	0.05	0.10	0.15	0.20	0.25	0.30	0.	35	TOTAL
2.0 1.8 1.7 1.6 1.5 1.4 1.3 1.2 1 3 4 0.8 0.7 0.6 0.5 0.4 0.2 LESS														
1.8 1.7 1.6 1.5 1.4 1.3 1.2 1 3 0.8 0.7 1 2 3 0.6 0.5 0.4 0.2 LESS														
1.7 1.6 1.5 1.4 1.3 1.2 1 3 0.8 0.7 0.6 0.5 0.4 0.2 LESS														
1.6 1.5 1.4 1.3 1.2 1 3 4 0.8 0.7 1 2 3 0.6 0.5 0.4 0.2 LESS														
1.5 1.4 1.3 1.2 1 3 4 0.8 0.7 1 2 3 0.6 0.5 0.4 0.2 LESS														
1.4 1.3 1.2 1 3 4 0.8 0.7 1 2 3 0.6 0.5 0.4 0.2 LESS														
1.3 1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS														
1.2 0.8 0.7 0.6 0.5 0.4 0.2 LESS														
0.8 0.7 0.6 0.5 0.4 0.2 LESS									_					
0.7 0.6 0.5 0.4 0.2 LESS								1	3					4
0.6 0.5 0.4 0.2 LESS	0.8													
0.5 0.4 0.2 LESS								1	2					3
0.4 0.2 LESS														
0.2 LESS														
LESS														
	0.2													
TOTAL 2 5 7	LESS								_					
	TOTAL							2	5					7

	NZ	MANEU	VERS	٧S	MU	BY MISS.	SEG.	MANUVR.	ALT.	LESS.	CT/S 0.	06
		LESS	0.0	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.	4											
2.	2											
2.	Ü											
1.	8											
1.	7											
1.	6											
1.	5											
1.	4											
1.												
1.	2											
0.	8											
0.	7											
0.	6								1			1
0.	5								_			_
0.	4											
0.	2											
LES												
TOTA									1			1
									_			_

NZ	MANEU	ERS VS	MU	BY MISS.	SEG.	MANUVR,	ALT.	LESS. C1	/S 0.	09
	LESS	0.CO	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4								0000	••••	
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3					2	4 19	2			8
1.2				1	7	4 19	2 12			39
0.8				•	•		••			,,,
0.7		1				21		2		32
0.6		_			1	21 2	8	•		4
0.5					•	-	•			•
0.4								1		1
0.2								•		•
LESS										
TOTAL		1		1	10	46	23	3		84

TABLE XXIX - contd.

	NZ	MANEUV	ERS VS	MU	BY MISS.	SEG.	MANUVR,	ALT.	LESS,	CT/S 0.	12
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4	•										
2.2											
2.0)										
1.0	3										
1.7	7										
1.6											
1.9											
1.4											
1.3											
1.7	2		2		2	1	1				6
0.1											
0.7											_
0.6							1				1
0.9											
0.4											
0.2											
LES!											
TOTAL	L		2		2	1	2				7

N	ZI	MANEUV	ERS 1	/S MU	BY MISS	. SEG.	PANUVR,	ALT.	1000, C1	r/s o.	09
	(LESS	0.00	0.05	0.10	0.15	0.20	0.25	c.30	0.35	TOTAL
2.4											
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											_
1.3					2	1	1	1			3 37
1.2				2	2	8	21	3	1		37
0.8					i 1						
0.7			ı	1	1	9	14	3	1		30 5
0.6						2	2	ı			5
0.5											
0.4											
0.2											
LESS				_				_	_		
TOTAL			1	3	3	20	38	8	2		75

NZ	MANEU	/ERS	٧S	MU	BY MISS.	SEG.	MANUVR,	ALT.	1000,	CT/S 0	-12
	LESS	0.00	0	.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3					1	_					
1.2						3	13	1			17
0.8							•				10
0.7						1	9				10
0.6											
0.5											
0.4											
0.2											
LESS.											
TOTAL					1	4	22	1			28

N	Z MANEU	VERS V	S MU	BY MISS.	SEG.	MANUVR,	ALT.	2000, C	T/\$ _. 0.	09
	LESS	0.00	0.05	9.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3				1 2	2 5		1			4
1.2				2	5	7	1			15
0.8										
0.7			1	1	4	7	1			14
0.6							1			1
0.5						1				1
0.4										
0.2										
LESS										
TOTAL			3	4	11	15	4			35

	NZ	MANEUV	ERS	VS MU	BY MISS.	SEG.	MANUVR.	ALT.	2000.	CT/S 0.	12
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.2											
2.0	ł										
1.8	1										
1.7	,										
1.6	•										
1.5	,										
1.4	•										
1.3	1										
1.2	?						4				4
0.8)										
0.7	,			1							1
0.6)										
0.5	,										
0.4	•										
0.2											
LESS											
TOTAL				1			4				5

NZ	MANEUV	ERS V	S MU	BY MISS.	SEG.	DESCRT,	ALT.	LESS.	CT/S 0	.06
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8 1.7										
1.6										
1.5										
1,4										
1.3										
1.2			1							1
0.8										_
0.7				2	1					3
0.6										
0.5				_						
0.4				1						1
0.2										
LESS			1	3	1					5
TOTAL				,						7

N	Z MANEU	VERS VS	MU	BY MISS.	SEG.	DESCNT.	ALT.	LESS.	CT/S 0.	09
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	C.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4		3 1								3
1.3		1	2	1	5 61	3				12
1.2		16	10	31	61	3 45	7			170
0.8										
0.7	1	9	12	14	37 2 2	21 5	5 2			99
0.6				1	2	5	2			9
0.5			1	1	2					4
0.4										
0.2										
LESS										
TOTAL	1	29	25	47	107	74	14			297

N	MANEU	VERS VS	MU	BY MISS.	SEG.	DESCRT,	ALT.	LESS, CT	'S 0.	12
2.4	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.0 1.8 1.7 1.6										
1.5 1.4 1.3			2		1					2
1.2 0.8 0.7		2	2	4	5	2				15
0.6 0.5 0.4 0.2 LESS			1							1
TOTAL		2	5	4	6	2				19

NZ	MANEU	iers vs	MU	BY MISS.	SEG.	DESCHT,	ALT.	LESS,	CT/S 0.	15
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6 1.5										
1.4										
1.3										
1.2										
9.8										
0.7		1								1
0.6		<u>-</u>								-
C.5										
0.4										
0.2										
LESS										
TOTAL		1								1

	NZ	MANEU	VERS V	S MU	BY MISS.	SFG.	DESCHT,	ALT.	1000, C	T/S C.	Ć6
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4	•										
2.2											
2.0											
1.6											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2											
0.5											
0.7						2					2
0.6						•					•
0.5											
0.4											
0.2											
LESS											
						2					2
TOTAL	•					~					•

TABLE XXIX - contd.

MŽ	RANEU	IERS VS	UM	BY MISS.	SEG.	DESCRT,	ALT.	1000, C	r/s o.	09
2.4 2.2 2.0	LESS	0.60	U .05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
1.8 1.7 1.6 1.5				1		1				2
1.4 1.3 1.2	ı	1 1 8	4	2 3 15	5 42	7 52	5			3 16 127
0.8 0.7 0.6 0.5		3 2	2	10	26 3	30 3	2			75 9
0.4 0.2 LESS TOTAL	1	15	6	32	78	93	7			232

NZ	MANEU	VERS VS	MU	BY MISS.	SEG.	DESCNT,	ALT.	1000. C	/S 0.	12
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										_
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3		1 2	1		2					4
1.2		2			7	2	1			12
0.8						_	_			
0.7		2	1	3	7	3	1			17
0.6		-	•	•	•	-	•			• •
0.5										
0.4										
0.2										
LESS										
TOTAL		5	2	3	16	5	2			33
					_		_			

	NZ	MANEU	VERS	٧S	MU	BY MISS.	SEG.	DESCHT.	ALT.	1000.	CI/S	0.	15
		LESS	0.00)	0.05	0.10	0.15	0.20	0.25	0.30	0.	35	TOTAL
2.4													
2.2	?												
2.0)												
1.5	3												
1.7													
1.6													
1.5													
1.4													
1.3													
1.2							1	1					2
0.8							•	•					•
0.7							1						1
0.6							•						•
0.9													
0.4													
0.2													
LESS													
							•	•					•
TOTAL	-						2	1					3

	NZ	MANEU	/ERS V	s MU	BY MISS.	SEG.	DESCNT.	ALT.	2000,	CT/\$ 0:	09
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4											
2.7 2.0											
1.6											
1.7											
1.0	5										
1.9						1					1
1.4					•	3	•				
l.3		2	1	1	2	2 18	19	1			5 44
0.6		•	•	•	•	••	• •	•			•
0.7					2	19	12	2			35
0.6		2				1	1				4
0.9							1				1
0.4											
LESS											
TOTAL		4	1	1	5	41	35	3			90

	MZ	MANEU	VERS	VS MU	BY MISS.	SEG.	DESCNT.	ALT.	2000.	CT/S 0.	12
		LESS	0.00	0.05	0.10	0.15	0.26	. 0.25	0.30	0.35	TOTAL
2.4	•										
2.2	2										
2.0											
1.6	3										
1.7	7										
1.6	5										
1.9	5										
1.4	•										
1.3											
1.3			1	Į.		2	2	1			6
0.1							_	_			
0.						1	4				5
0.						_	4 2				2
0.							_				_
0.											
0.											
LES											
TOTAL			1	l		3	8	1			13

	NZ	MANEU	VERS	٧S	MU	BY MI	ss. s	SEG.	STEADY,	Al.T.	LESS,	CT/S	0.	06
		LESS	0.0	0	0.05	0.10		0.15	0.20	0.25	0.3	o c.	35	TOTAL
2.4														
2.2														
2.0														
1.6														
1.6														
1.5														
1.4														
1.3														
1.2				1					4					5
0.8														_
0.1									1					ı
0.5														
0.4														
0.2														
LESS														
TOTAL	•			1					5					6
TIME		2.9	20.	5	1.9	0.	7	1.0	8.0	3.6	0.	(38.7

N	Z MANEU	VERS V	MU	BY MISS.	SEG.	STEADY.	ALT.	LESS,	CT/S O	.09
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6							1			1
1.5							1			1
1.4					2	3	2			7
1.3	_	4		2	14	11	10			41
1.2	2	13	4	17	130	216	60	2		444
0.8		_								
0.7	1	14	4	14	120	166	82	2		403
0.6			1		12	16	7	1		37
0.5					3	1				4
0.4										
0.2							1			1
LESS	_							_		
TOTAL	3	31	4	33	281	413	164	5		939
TIPE	64.5	389.4	50.7	93.4	745.6	916.0	238.9	3.6	0.	2502.3

	NZ	MANEU	ERS V	IS MU	BY MISS.	SEG.	STEADY,	ALT.	LESS.	CT/S 0	-12
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4	•										
2.2											
2.0											
1.0											
1.7											
1.6											
1.5											
1.4											
1.					_	_	_	_			
1.			ı		1	3	3	6			14
0.			•				•				
0.			3			1	3	8	•		15
0.6											
0.9											
0.2											
LES											
TOTAL			4		1	4	6	14			29
	•		•		•	•	•	**			27
TIME		0.	24.7	5.1	2.6	56.9	109.0	37.4	0.3	9 0.	235.9

	NZ	HANEU	/ERS	٧S	HU	BY	MISS.	SEG.	STEADY.	ALT.	LESS,	CT/S	0.	15
		LESS	0.00)	0.05	(0.10	0.15	0.20	0.25	0.3	0 0	. 35	TOTAL
2.4														
2.2														
2.0														
1.6														
1.														
1.6														
1.4														
1.3														
1.2										2				2
0.1										_				_
0.7										2				2
0.6										2 2 1				2
0-9										1				1
0.4														
0.3														
LESS										7				7
·VIA	•									•				•
TIPE		0.	3.	2	0.2		0.6	9.2	23.3	18.5	0.	() .	55.1

N	Z MANEU	IVERS VS	MU	BY MISS.	SEG.	STEADY.	ALT.	1000, 0	T/S 0.	09
	LESS	0.CO	0.05	0.10	0.15	.0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4					2	2				4
1.3					1	9	1			11
1.2		3	1	1	39	124	52			220
0.6										
0.7			1	2	31	86	38			158
0.6					2	6	2			10
0.5					3					3
0.4										
0.2										
LESS										
TOTAL		3	2	3	78	227	93			406
TIME	35.7	171.9	33.3	57.4	535.0	801.8	271.8	4.9	0.	1911.9

1	NZ	MANEUV	ERS	VS MU	BA MIZZ.	SEG.	STEADY,	ALT.	1000.	CT/S O	.12
2.4 2.2 2.0 1.8 1.7 1.6		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
1.4 1.3 1.2 0.8						5	1 15	11			1 31
0.7 0.6 C.5						4	13	7			24
0.4 0.2 LESS TOTAL						9	29	18			56
TIME		2.6	11.4	2.5	7.4	98.5	285.9	70.4	0.	0.	478.8

N	Z MANEU	VERS V	S MU	BY MISS.	SEG.	STEADY,	ALT.	1000.	CT/S 0.	.15
	LE\$S	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4					-					_
1.3					2					2
1.2						4				4
0.7						1	1			2
0.5						•	•			2
0.5										
0.4										
0.2										
LESS										
TOTAL					2	5	1			
TIME	0.1	0.7	0.2	0.5	19.9	55.7	18.6	0.3	0.	95.9

	NZ	MANEU	VERS	٧S	MU·	BY MISS.	SEG.	STEADY,	ALT.	2000.	CT/S	0.09
		LESS	0.00	•	0.05	0.10	0.15	0.20	0.25	0.30	0.3	5 TOTAL
2.4	•											
2.2												
2.0												
1.8	}											
1.7	,											
1.6												
1.5												
1.4												
1.3							1	4	1			6
1.2		1					26	80	23	1	l,	131
0.6												
0.7							23	77	22			122
0.6							1	6	1			8
0-5												
0.4												
0.2												
LESS								. 47	4.7		1	247
TOTAL		1					51	167	47	1		267
TIPE		4.9	1.4	•	1.2	14.0	190.3	489.3	189.2	9.1	0.	899.4

NZ	MANEU	VERS V	S MU	BY MISS.	SEG.	STEADY,	ALT.	2000. C	1/5 0.	12
2.4	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	G.35	TOTAL
2.2 2.0										
1.8										
1.7 1.6										
1.5										
1.4						•				_
1.3 1.2						1 2	? 14			3 16
9.8										
0.7 0.6					1	7	6			14
0.5										
0-4										
0.2 LESS										
TOTAL					1	10	22			33
TIME	0.	0.	0.	18.9	22.6	75.6	104.7	1.7	0.	223.5

NZ	MANEUV	ERS VS	MU	BY MISS.	SEG.	STEADY,	ALT.	2000, 6	i:\$ 0.	15
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	C.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3							1			1
1.2							1			•
0.8 0.7										
0.6										
0.5										
0.4										
C. 2										
LESS										
TOTAL							1			1
TIPE	0.	0.5	0.	0.	1.7	11.6	2.1	0.	0.	15.9

TABLE XXX MANEUVER $\mathbf{n_z}$ VERSUS μ BY MISSION SEGMENT

				ASCENT	SEG.	BY MISS.	MU	s vs	MANEUVE	NZ
TOTA	0.35	0.30	0.25	0.20	0.15	0.10	0.05	-00	LESS	
										,4
										.2
										8
										7
										6
										5
								_		4
1		1	1 3	3 46	1 70		2	1 12		3
.		4	3	70	70	14	2	12		2
1			1	32	34	14	11	19	2	8
_			•	32 1 2	34 3	14 1	••	í	•	6
			1	2						5
				1						.4
										2
•		•				••			_	S
2		1	6	85	198	29	13	33	2	NL.

N2	MANEU	VERS V	S MU	BY MISS.	SEG.	MANUVR				
2.4	LESS	0.00	0.05	0.10	0.15	0.20	. 0.25	0.30	0.35	TOTAL
2.4 2.2										
2.0										
1.4										
1.7										
1.6										
1.5										
1.4										
1.3				2	5	5	•			16
1.2		2	2	7	5 24	5 65	17	1		118
0.8		•	_	•	- '			•		
0.7		2	3	2	14	51	12	3		87
0.6		_	_	•	14	5	4	_		12
0.5					_	1	_			ī
0.4						_		1		ī
0.2								_		-
1555										

	NZ	MANEU	VERS V	S MU	BA WIZZ"	SEG.	DESCNT				
		LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4	•										-
2.2	?										
2.0)										
1.0											
1.7											
1.6					1		1				2
1.5				2	•	1	-				3
1.4			4	-	2	ī					3
1.3			3	3	5	14	12				37
1.2		3	30	18		136	123	15			377
0.8				-		•	•••	4.5			•
0.7		1	15	15	31	96	70	10			236
0.6) 2	2	1	ì	6	ii	Ž			25
0.5		_	_	ĩ	Ĭ	2	1	_			5
0.4				_	ĭ	_	•				ĩ
0.2					•						•
LESS											
TOTAL		6	54	40	94	256	218	27			695

N2	MANEU	IVERS V	S MU	BA WIZZ	. SEG.	STEADY				
	LFSS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6							1			1
1.5							1			1
1.4				_	4	5	. 2			11
1.3	_	4	_	2	18	26	14	_		64
1.2	3	18	5	19	203	448	169	3		868
0.8			_					_		
0.7	ı	17	5	16	180	354	166	2		741
0.6			1		15	28	12	1		57
0.5					6	1	1			8
0.4							•			
0.2							1			1
ESS ITAL		30			434	04.3	247			1767
ITAL	4	39	11	37	426	862	367	6		1752
ME	110.8	623.6	95.2	195.6	1680.7	2776.1	955.2	20.0	0.	6457.3

TABLE XXXI MANEUVER n_z VERSUS AIRSPEED BY MISSION SEGMENT

LE	22	40	60	80	85	90	75	100	105	110	115	120	125	130	135	146
		••	-	•							•••			•••		
	1			2	1		1		1							
	14	10	54	2 19	•	12	13	10	Š	1					1	
		_		_	_		_									
	31 i	5	37 3	2	•	\$	•	5	3							
	•		-	•	1	1			1							
				1												
	.7	15	94	33	20	10	23	15	10	1					1	
LZ MAN																
	IEUVEI	ts vs	VEL. BI	MISS.	SEG. M	MUVR										
LES		40	40 40	, 4122. 60	566. M	MUVR 90	95	106	105	110	115	120	125	130	135	140 1
-							95	1//6	105	110	115	120	125	130	135	140 1
-							95	106	105	110	115	120	125	130	135	148 1
-							•5	106	105	110	115	120	125	130	135	140 1
_							15	106	105	110	115	129	125	130	135	146 1
_							15	106	105	110	115	120	125	130	139	100 1
-							15	146	105	119	115	120	125	130	139	146 1
LES	is.	40	40	80	85	90				110	115	1		130		146 1
LES		40					•5 1	106 2 10	105 2 11		115		125	136	135	146 1
LES	3	1 7	40 3 15	*0 3 12	85 1 16	10 10	1 17	2 10	2 11	1		1	1			146 1
LES	is.	40	40	*0 3 12	85	90					115	1		130		146 1
LES	3	1 7	40 3 15	80	85 1 16	10 10	1 17 13	2 10	2 11	1		1	1	z		146 1
LES	3	1 7	40 3 15	*0 3 12	85 1 16	10 10	1 17 13	2 10	2 11	1		1	1			146 1
LES	3	1 7	40 3 15	*0 3 12	85 1 16	10 10	1 17 13	2 10	2 11	1		1	1	z		146 1

MZ	HAMEUV	ERS VS	VEL. B	Y MISS.	SEG. D	ESCMT											
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4 2.2 2.0																	
2.Z																	
2.0																	
1.0																	
1.7																	,
1.6 1.5		•		•		•											i
1.3	•		•	•													7
1.4 1.3 1.2	7		15			2	•										37
1.3	••	28	10 115	36	43	3 44	27	16	•	•	1	3	1				377
0.8	••	•••	•••		••	•••	•	•	•	•	_	_	-				
0.8 0.7 0.6	31	21	68	35	25	26	7	16	1	•	1		1				238 25 5
9.6	31 5		68 5	35 3	25 1	26 3	7	16			2						25
0.5	i		1	2		1											5
0.5			1														1
0.2																	
LESS																	
TOTAL	98	54	202	82	72	80	43	34	7	12	•	3	2				495

	LESS	40	6 0	80	85	90	95	100	105	110	115	120	125	130	135	140 TOTAL
2.4	****	10	•	•••				•••		•••						
2.3																
2.0																
1.4																
1.7																
1.4											1					1
1.5											1					1
1.4			4		1		4				2					11
2.4 2.2 2.0 1.5 1.4 1.3 1.2 0.7 0.4	26	i 10	13 116	7 76	107	5 103	11 126	104	71	4 51	40		1	_		
1.2	26	10	116	7.	107	103	124	104	71	51	40	25	•	2		848
0.8														_		
0.7	23		104	58 12	101	92	89	73	**	51 3	45	35 2	14 1•	ž		74 <u>1</u> 57
0.4	1		3	12	3	•	•3	•	10	3	Z	Z	1.	1		37
0.5			•	Z				1		1						•
0.4																
																•
LESS			344		214	304	220	104	132	111	96	42	25			1752
TOTAL	54	14	246	155	214	204	239	184	132	***	-	44	23	,		1.174
TIME	421 7	104 1	1744.5	444 0	786.1	720 6	441 7	501 8	411.7	314.0	105.1	128.4	84.4	13.2	0.	0. 4457.3

TABLE XXXII MANEUVER n_z VERSUS µ

	#2 M	AMEUVER!	s vs	MU COI	POSITE					
• •	LESS	0.00	0.05	0.10	0.15	0.20	0.25 -	0.30	0.35	TOTAL
2.4 2.2										
2.0										
1.7										
1.6				1		1	1			3
1.5			2		1	_	1			•
1.4		•		2						123
1.3	•	42	27	92	38 433	46	19 204	5		1211
j. 6	•		• •	**	423		204	•		••••
6.7	4	53	34	43	324	507	189	5		1179
0.6	2	3	2	2	27	45	10	1		100
0.5			1	j	•	5	2			17
0.4				ı			1			3
LESS							•			•
TOTAL	12	130	69	171	≥1.e	1292	437	12		2959

TABLE XXXIII MANEUVER $n_{\mathbf{Z}}$ VELSUS AIRSPEED

	LESS	40	60	80	85	90	95	100	195	110	115	120	125	130	135	140 TOTAL
2.4 2.2 2.0 1.8																
2.2																
2.0																
1.8																
1.7																
1.6	_	1				ı					•					
1.5	2		4	•							•					£.
1.4		4	26	16	÷	•	17	•		•	- 1	•	•			12
1.3	11 92	55	302	143	175	179	183	146	93	5 64	41	29	ıi	,	2	151
1.2	72	77	302	143	•••		147		**	••	7.	.,	••	•	•	
0.8	89	36	222	104	145	140	118	102	57	60	47	35	18	4		117
0.6	~;		12	19	4	10	25	•	11	3	5	35 2	1	1		10
0.5	i		5	4	1	2	ī	i	1	ì						I.
0.4	_		1	1										1		
0.2										1						
LFSS																
GTAL	206	78	574	291	335	341	336	260	170	136	102	61	31	•	2	299

Security Classification

Security classification of title, body of electract and index	NTROL DATA - R&B ing ennotation must be ent		the everall report is classified)
1. ORIGINATING ACTIVITY (Corporate author)	فينسم ومنسطوب المنبوب المتأوب		RT SECURITY CLASSIFICATION
Technology Incorporated	j	Un	classified
<u> </u>		2 4 GROUP	
Dayton, Ohio			
3 REPORT TITLE			
CH-47A Chinock Flight Loads Investig	ation Program		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)			
\$ AUTHOR(S) (Last name, first name, initial)			
Braun, Joseph F.			
Giessler, F. Joseph			
6 REPORT DATE	74. TOTAL NO. OF PA	623	75. NO. OF REFS
July 1966	184		5
Se CONTRACT OR GRANT NO.	Se. ORIGINATOR'S RE	PORT NUM	BER(S)
DA 44-177-AMC-221(T)			
b. PROJECT NO.	USAAVLABS T	echnic	al Report 66-68
Task 1P125901A14229			
с.	Bis 103011)	10(3) (Any	other numbers that may be sesigned
4.			
10 AVAILABILITY/LIMITATION NOTICES			
Distribution of this document is unlim	nited.		
11 SUPPLEMENTARY NOTES	12. SPONSORING MILIT	ARY ACT.	VITY
	US Army Aviat	ion Ma	iteriel Laboratories
	Fort Eustis, V	irginia	1
13 ABSTRACT	•		
This report covers the collection are			

This report covers the collection and presentation of 165 hours of usable flight data for the CH-47A helicopter. The data recording system and the data processing procedure are described, and an analysis summary of the results of the flight data is presented. The flight data were recorded between 9 September 1964 and 2 December 1965. The area of operation was primarily at or adjacent to Fort Benning, Georgia. To analyze parameters according to distinct flight phases, the reduced data were separated into four mission segments: (1) takeoff and ascent; (2) maneuver; (3) descent, flare, and landing; and (4) steady state. In the form of tables, histograms, and exceedance curves, the data indicate the time flown in the mission segments and parameter ranges and the number of parameter peaks occurring in the missions and ranges of other parameters. Exceedance curves are given for both the maneuver and the gust normal load factors.

DD .5084. 1473

Unclassified
Security Classification

Security Classification

14. KEY WORDS	LIN	IK A	LIN	K B	LINKC		
KEY WORDS	ROLE	WT	ROLE	WT	ROLE	₩T	
Aircraft Structures Operational Airloads							
INSTRUCTI	ONS						

- 1. OPIGINATING ACTIVITY: Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (corporate author) issuing the report.
- 2a. REPORT SECURITY CLASSIFICATION: Enter the overall security classification of the report. Indicate whether "Restricted Dats" is included. Marking is to be in accordance with appropriate security regulations.
- 2b. GROUP: Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.
- 3. REPORT TITLE: Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.
- 4. DESCRIPTIVE NOTES: If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.
- 5. AUTHOR(S): Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.
- 6. REPORT DATE: Enter the date of the report as day, month, year, or month, year. If more than one date appears on the report, use date of publication.
- 7a. TOTAL NUMBER OF PAGES: The total page count should follow normal pagination procedures, i.e., anter the number of pages containing information.
- 7b. NUMBER OF REFERENCES. Enter the total number of references cited in the report.
- 8a. CONTRACT OR GRANT NUMBER: If appropriate, enter the applicable number of the contract or grant under which the report was written.
- 8b, 8c, & 8d. PROJECT NUMBER: Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.
- 9s. ORIGINATOR'S REPORT NUMBER(S): Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.
- 9b. OTHER REPORT NUMBER(S): If the report has been assigned any other report numbers (either by the originator or by the sponsor also enter this number(s).

The second secon

- 10. AVAILABILITY/LIMITATION NOTICES: Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:
 - (1) "Qualified requesters may obtain copies of this report from DDC."
 - (2) "Foreign announcement and dissemination of this report by DDC is not authorized."
 - (3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through
 - (4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through
 - (5) "All distribution of this report is controlled. Qualified DDC users shall request through

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

- 11. SUPPLEMENTARY NOTES: Use for additional explanatory notes.
- 12. SPONSORING MILITARY ACTIVITY: Enter the name of the departmental project office or laboratory sponsoring (paying for) the research and development. Include address.
- 13. ABSTRACT: Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. KEY WORDS: Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Idenfers, such as equipment hodel designation, trade name, military project code name, geographic location, may be used as key words but will be followed by a. indication of technical context. The assignment of links, rules, and weights is optional.

Unclassified

Security Classification